REPORT

OF

THE HEAVY INDUSTRIES PLAN COMMITTEE

FOR

DEVELOPMENT OF
LARGE AND MEDIUM SCALE INDUSTRIES
IN

UTTAR PRADESH

DURING THIRD FIVE YEAR PLAN

FOREWORD

> *"India was not weak militarily and was prepared to meet any challenge to her integrity. But it was clear that the finest army in the world would crack up unless it was backed by a strong economy based on heavy industries.*
>
> *Without laying strong foundations of heavy industry, the problem of poverty also could not be solved. A nation became prosperous only by developing heavy industries. This did not mean that small, medium and cottage industries had to be overshadowed or neglected. They had their own place which would remain and receive encouragement.*
>
> *—Jawahar Lal Nehru.*
>
> (Extract from the speech delivered by the Prime Minister of India while addressing the Fifth Delhi Pradesh Political Conference, held in New Delhi on November 22, 1959.)

The above words from the Prime Minister well depict the significance and importance of heavy industries, as the *sine-qua-non-* for amelioration of economic condition of the country. These basic industries not only cut down the imports and thus make the country comparatively self-sufficient, but they also open up new avenues of employment, earn valuable foreign exchange and add to the wealth of the nation.

The State of UTTAR PRADESH——endowed with abundant resources of raw materials, agricultural and horticultural, like sugarcane, oil-seeds, sunn-hemp, fruits, etc.; vast stretches of forests, yielding resins, fir, pine, spruce, timber and soft woods; huge quantities of industrially useful by-products and co-products such as bagasse, molasses, alcohol; widely scattered mineral deposits of magnesite, fire-clay, limestone, gypsum, quartzite, felspar and still unexploited tracts of coal-fields, haematite and copper; good availability of skilled as well as semi-skilled and unskilled labour on reasonable wages; almost unlimited supplies of water, land and other locational facilities, considering the vastness of the area and variety of topographical, climatic and other physical features; and great possibilities of generating cheap electric power, utilising the flow of perennial rivers down the Himalayan slopes-possesses vast potentialities for industrial development of a modern type.

Added to the above, the State has a populace amounting to almost one-sixth of the whole country. The density of population is 558/sq. miles as against the average of 303 for the country as a whole. While this brings to the surface the importance of the State as the most significant consuming area in the country——ideal for location of consumer goods industries, light mechanical and electrical engineering units, and fertilizer and insecticide factories to cater to the huge agricultural needs of this sizable part of the country——it also pinpoints the dire need for providing gainful employment to this huge man-power.

As it is, however, the industrial map of UTTAR PRADESH today does not depict a happy position, as compared to the all India pattern.

While the *per capita* investment figure for the country as a whole is estimated to rise from 20 in 1952 to 57 in 1961, the corresponding rise for U. P. would be only from 11.5 to 20.6. It is thus evident that there is not only a considerable scope but also an urgent need for taking up a well-balanced and progressive programme for development of heavy, large and medium scale industries in the State.

Alive to this vital cause for industrial development of the State, the Government of UTTAR PRADESH had lately set up a committee known as the Heavy Industries Plan Committee, to advise them in formulating proposals and drawing up projects for establishment of new large and medium scale industries and for development of new lines of production in existing industries in the State, both in the public and private sectors. This Report in which an attempt has been made to deal with all material aspects of development of large and medium scale industries in UTTAR PRADESH, during the Third Five-Year Plan, is the outcome of strenuous work done by the Committee during the short period of its existence. It is hoped that the endeavour of the Committee would find favour with the Government and would be able to give some satisfaction to the people of the State in general and its industrial community in particular.

CONTENTS

Page

Background .. (i)

The Heavy Industries Plan Committee— Constitution and Working of— .. (iii)

PART A—SUMMARY REPORT OF THE WORKING GROUP FOR:

1. Pulp and Paper 1
2. Ceramics 7
3. Fermentation Industries 11
4. Plastics and Allied Industries 15
5. Heavy Chemicals and Fertilizers 18
6. Fine Chemicals and Pharmaceuticals 29
7. Oils and Surface Coating 37
8. Food and Allied Industries 41
9. Electrical Engineering 45
10. Mechanical Engineering 51
11. Metallurgical Industries 61
12. Minerals 71
13. Leather and Allied Industries 79
14. Forest Products 83
15. Sugar Industry 89
16. Textile Industry 96
17. Government Precision Instruments Factory, Lucknow .. 105
18. Government Cement Factory, Churk 112

PART B—GENERAL OBSERVATIONS ABOUT SCHEMES PERTAINING TO ALL THE GROUPS:

19. Industrial Research 119
20. Establishment of Design-cum-Research Centre 120
21. Technical Man-Power Resources— Augmentation of— 121
22. Establishment of heavy Industries Corporation 123
23. Development of Minerals—Establishment of Mineral Development Corporation 126
24. Earmarking and development of Industrial Areas and Techno-Economic survey of prospective areas for industrial development 127
25. Requirements of Rail and Road Transport 128
26. Locational pattern of various industrial projects .. 131
27. Incentives necessary for private sector 132
28. Need for strengthening of heavy industries organisation .. 135

Page

PART C—CONCLUSIONS:

29. *CHIEF CONVENER'S REPORT*—A Review of Third Plan Proposals—Details of capital cost, power requirements, foreign exchange component, employment potential and other relevant particulars in respect of various schemes recommended for Third Five Year Plan 139

PROFORMA 'X' 153

30. Summary of main recommendations 193

APPENDICES.

I. Constitution of Working Groups of the Committee for different groups of industries 201

II. Requirements of Heavy Industries Organisation .. 216

III. Area-wise distribution of proposed industrial units in Uttar Pradesh 218

IV. Requirements of power for expansion of existing large and medium scale undertakings during Third Five Year Plan period 220

BACKGROUND

Development of large scale industries in UTTAR PRADESH during the First Five Year Plan in the State sector was, more or less, confined to establishment of two factories, *viz.*, the Government Precision Instruments Factory at Lucknow and the Government Cement Factory at Churk (Mirzapur). The Government Precision Instruments Factory was a unique venture of the State Government envisaging manufacture of instruments like water meters which were not till then produced elsewhere in the country. The other factory was the first cement factory set up in the State. Both these factories were faced with initial troubles, but ultimately achieved successful commercial working. During the the Second Five Year Plan, the capacity of the Government Precision Instruments Factory was expanded three fold, and the factory has since achieved the revised production targets of 36,000 water meters and about 300 microscopes per year. It has also taken up manufacture of pressure guages and medical and surgical instruments. The production capacity of the Government Cement Factory is also being doubled during the Second Plan and with the completion of the expansion programme, this factory would be producing 1,400 tons of cement per day. The present capital cost of the Government Precision Instruments Factory is about Rs. 40 lacs, while that of the Government Cement Factory is Rs. 4.08 crores.

2. Despite their limited financial resources, the State Government also sanctioned large sums of loans to a number of private industrialists during 1954-58. This venture envisaged stimulating industrial activity in the private sector, and the projects for which the loans were advanced are in progress and some of them have gone into production. The details of the loans advanced by the State Government are as under:—

(1)	M/S New Central Jute Mills Co., Ltd., Calcutta. ..	Rs. 1.45 crores for setting up a soda-ash-cum-ammonium chloride factory in U.P.
(2)	M/S J. K. Cotton Spinning & Weaving Mills Co. Private Ltd., Kanpur.	Rs. 0.50 crore for setting up a rayon yarn filament factory in U.P.
(3)	M/S Lakshmiratan Engineering Works Ltd., Bombay. ..	Rs. 0.50 crore for setting up a factory for manufacturing textile machinery parts in U.P.
(4)	M/S Vibhuti Glass Works Private Ltd., Ramnagar, Varanasi. ..	Rs. 0.11 crore for working capital and for the purchase of certain essential equipments.
(5)	M/S Bist Industrial Corporation, Naini Tal. ..	Rs. 0.40 crore for setting up a joint stock sugar factory at Kichha, (Nainital).

3. In the private sector, nearly 500 industrial undertakings in the State were licensed under the Industries (Development & Regulation) Act, during the First and Second Plan period (upto October 1959). It is estimated that the total investment in the private sector, during the Second Plan period, would be about Rs. 60 crores. A large part of this investment would, however, be accounted for by the projects on Synthetic Rubber, Aluminium and Soda Ash. Most of the remaining investment would be on the expansion of sugar factories, establishment of new alcohol units and chemical engineering industries.

4. The total investment of the Government of India on different industrial projects in the public sector, during the First and Second Plan periods, is estimated to have been between Rs. 800 crores to Rs. 900 crores. This investment was made in different States, but, unfortunately, no Government of India unit other than a railway component factory at Varanasi was established in Uttar Pradesh. It is hoped that in accordance with the Industrial Policy Resolution, the claims of this State would receive due consideration by the Government of India, while considering future allocation of industrial units in their sector, so as not only to provide for its due share during the Third Five Year Plan but also to make up the lee-way of the First and Second Plan periods.

5. The endeavours of the State could, however, be deemed only as the very beginning considering the magnitude of available industrial potential of the State, which could not be appropriately exploited during the First and Second Plan periods. All the excellent resources of the State deserve to be systematically studied and utilised for the best advantage and development of large and medium scale industries.

THE HEAVY INDUSTRIES PLAN COMMITTEE—CONSTITUTION AND WORKING OF—

Constitution of the Committee.

In order to advise the State Government in formulating proposals and drawing up projects for the establishment of new large and medium scale industries in the State and for development of new lines of production in the existing industries, both in the public and private sectors, as also to prepare a Master Plan for the same for the next 15 years, a Heavy Industries Plan Committee was suggested by the Additional Director of Industries (Heavy Industries), Uttar Pradesh, through D. O. No. 6947/HI/895/IX-(a), dated March 6, 1959. It was constituted vide Government Office Memorandum No. 1384EP/XVIII-B-44H/59, dated May 9, 1959, consisting of the following personnel:—

CHAIRMAN:

(1) Secretary to Government, U. P.
Industries (B) Department,
Lucknow.

MEMBERS:

(2) Director of Industries,
Uttar Pradesh.

(3) Development Commissioner,
Uttar Pradesh.

(4) Secretary to Government, U. P.,
Forest Department.

(5) Secretary to Government, U. P.,
Power Department.

(6) Director, Government Cement
Factory, Churk, Mirzapur.

(7) Jt. Secretary to Government, U. P.,
Cultural Affairs and
Scientific Research Department.

(8) Jt. Secretary to Government, U. P.,
Planning Department.

(9) Cane Commissioner,
Uttar Pradesh.

(10) Dr. Ram Das,
Director, Planning Action-cum-
Research Institute, Lucknow.

(11) Dr. H. Trivedi,
Principal,
H. B. Technological Institute,
Kanpur.

(12) Sri K. C. Gupta,
General Manager,
KESA, Kanpur.

(13) Prof. C. S. Ghosh,
Head of Electrical Engg. Deptt.,
Roorkee University,
Roorkee.

(14) Sri R. K. Basu,
Chief Engineer,
Roadways Central Workshop,
Kanpur.

(15) Dr. Gopal Tripathi,
Principal,
College of Technology,
Hindu University,
Varanasi.

(16) Dr. V. S. Dubey,
Professor of Economic Geology,
Hindu University,
Varanasi.

(17) Sri S. C. L. Jain,
Works Manager,
Sahu Chemicals, Sahupuri,
Varanasi.

(18) Dr. A. R. Kidwai,
Reader in Chemistry,
Muslim University,
Aligarh.

(19) Dr. Atma Ram,
Director,
Central Glass and
Research Institute,
Calcutta.

(20) Director,
Geology & Mining, U. P.,
Lucknow.

(21) Dr. S. R. D. Guha,
Senior Research Officer-incharge,
Cellulose and Paper Branch,
Forest Research Institute,
Dehradun.

(22) Dr. Satya Prakash,
Secretary,
Scientific Research Committee,
Allahabad.

(23) Prof. K. N. Kaul,
Director,
National Botanical Gardens,
Lucknow.

(24) Dr. B. Mukerji,
Director,
Central Drug Research Institute,
Lucknow.

(25) Sri S. N. Gundu Rao,
Director,
National Sugar Institute,
Kanpur.

(26) Dr. D. N. Srivastava,
Director,
Fruit Utilisation,
Ranikhet.

(27) Sri M. M. Lal,
Chief Chemist,
Govt. Cement Factory,
Churk, Mirzapur.

(28) Dr. M. H. Desai,
Delhi Polytechnic,
Delhi.

(29) Sri G. N. Tandon,
Director,
GEC of India Private Ltd.,
Kanpur.

(30) Sri V. A. Kny,
Lakshmiratan Cotton Mills,
Kanpur.

(31) Sri R. Sahai, IFS.,
Chief Conservator of Forests,
Nainital.

(32) Sri S. S. Johari,
Superintendent,
Ordinance Factory,
Kanpur.

(33) Dr. S. D. Mahant.
Secretary,
National Research
Development Corporation,
New Delhi.

(34) Dr. Hari Narain,
Superintending Geophysicist.
Oil and Natural Gas Commission.
Dehradun.

(35) Dr. Surendra Rohtagi,
Hind Chemicals,
Kanpur.

(36) Sri J. J. Bagchi,
Superintendent,
Defence Research Laboratories,
Kanpur.

MEMBER-SECRETARY:

(37) Sri K. N. Srivastava, IAS.,
Addl. Director of Industries,
(Heavy Industries), U. P.

2. The Committee was authorised to appoint suitable Working Groups and also to co-opt any person as a member of the Committee or any Working Group.

3. The Additional Director of Industries (Heavy Industries), U. P., Member-Secretary of the Committee, was also appointed Chief Convener of the Working Groups.

4. The Ministry of Commerce & Industry, Government of India, were approached with the request to allow the officers of their Development Wing to render valuable assistance and advice in the Committee's business ventured by the State Government.

5. The Committee was initially required to submit its Report to the State Government, within a period of four months. Subsequently, its term was extended upto January 31, 1960, vide the State Government Office Memorandum No. 3428EP/XVIII-B-44H/59, dated September 25, 1959. (It is now proposed to make this Committee a standing one, to assist the State Government in the execution of their various programmes for industrial development.)

Terms of reference.

6. The terms of reference of the Committee were:

(*a*) To draw up a nucleus of the development programme for setting up heavy industries in the State, both in the private and public sectors, during the Third, Fourth and Fifth Five-Year Plans, and to recommend an order of priority for the same.

(*b*) To draw up preliminary project reports in respect of the proposals which should be given high priority for execution during the Third Five Year Plan.

(*c*) Wherever projects have already been decided upon for execution by the Government of India, to prepare concrete proposals, together with preliminary project reports, for recommendations to be made to the Government of India regarding the establishment of such industries in the State.

Additional Membership of the Committee.

7. The Committee was strengthened by additional membership as under:

Vide State Govt. Office Memorandum No. 2374 EP/XVIII-B-44H/59, dated 11-7-59:

(38) The Chief Engineer,
State Electricity Board,
Lucknow.

Vide State Government Office Memorandum No. 3618EP/XVIII-B-44H/59, dated 8-10-59:

(39) The Secretary to Govt. U. P.,
Co-operative Deptt.,
Lucknow.

(40) The Registrar,
Co-operative Societies, U. P.,
Lucknow.

Vide State Government Office Memorandum No. 3870EP/XVIII-B-44H/59, dated 23-10-59:

(41) Dr. Baljit Singh,
Head of Economics Deptt.,
University of Lucknow,
Lucknow.

Method of Enquiry.

8. Pending issue of formal Government Orders for the constitution of the Committee, an exploratory meeting thereof was held in the Directorate of Industries at Kanpur, on April 7, 1959, which was attended by majority of the members and in which the lines of action were generally discussed and 14 Working Groups to undertake necessary preparatory work for different groups of industries were formed. The details about the personnel structure for each Working Group are contained in the Appendix I.

9. A meeting of Conveners of the Working Groups was held in the Directorate of Industries on April 7, 1959, immediately after the exploratory meeting of the Heavy Industries Plan Committee. In this meeting, the lines for selection of various industries for inclusion in the Third Five Year Plan and in the Master Plan, were determined and a programme of work was generally chalked out. It was agreed that the selection of various industries should be based on the following considerations: —

(*i*) Availability of raw materials in the State.

(*ii*) Quantity of import of products into the country.

(*iii*) Consumption of products in the country as compared to existing indigenous production.

(*iv*) Other facilities of manufacture available in the State.

10. The Conveners were requested to determine priority amongst the various proposals they decided to make, as also to suggest whether a particular project could profitably be taken up in the private, co-operative or public sectors. In the event of a project being recommended for the public sector, they were further required to indicate whether it should be taken up by the State Government or by the Government of India.

11. It was further explained to the Conveners that the preliminary project reports to be prepared should be in the form of nucleus reports which should deal briefly with the following salient points, with suitable modifications as and where necessary: —

(1) Estimated production capacity of the plant.

(2) A quantitative estimate of various raw materials to be used.

(3) A sketch of the process to be used for manufacture.

(4) An estimated cost of the project, indicating distribution of the cost over buildings, plant and equipment, and working capital —giving approximate idea of the profit and loss account.

(5) Indication of fuel, power and water requirements.

(6) Indication of requirements of labour, semi-skilled and skilled, showing the employment potential of the scheme.

(7) The amount of foreign exchange required—recurring as well as non-recurring, and the ultimate savings in foreign exchange, availability of indigenous machinery, and need for foreign technical assistance.

(8) Suggested location of the plant.

(9) Marketing possibilities—present as well as future.

12. It was further indicated that information with regard to the following points should also be included, as far as possible, and shown in suitable appendices to the nucleus reports:—

(*a*) Description of the scheme, with particulars about total cost, foreign exchange required and physical targets, during the period 1961-66.

(*b*) Year-wise physical targets anticipated to be achieved during the Third Plan period.

(*c*) Year-wise break-up and estimates of total expenditure during the Third Five-Year Plan period, showing also the revenue and capital expenditure, as well as the recurring and non-recurring foreign exchange involved, separately.

(*d*) Year-wise requirements of (*i*) power, fuel and water, (*ii*) imported machinery, and (*iii*) essential materials, such as, iron, steel and cement.

(*e*) Main benefits accruing from the project—estimated profit, cost benefit ratio, foreign exchange savings/earnings, as well as the estimated employment potential, both direct and indirect.

(*f*) Requirements of raw materials used, their quantities and costs —of the total as well as of the indigenous part.

13. It was considered desirable that a summary of the essential data in respect of every project may be given in a tabular form to be known as 'Proforma X'. This proforma as prepared by a working group would give the items in order of priority recommended by the Group for the Third Plan, tentative location for every project, its power requirements, proposed capacity of the plant, total cost of the project, its foreign exchange component, the estimated annual foreign exchange savings/ earnings, employment potential, as well as the sector in which the project is proposed to be established.

14. It was left to the discretion of the Working Groups to make any addition or alteration in the items included under each Group, as considered necessary after full study. A suitable time schedule for submission of the nucleus reports by the Groups was also laid down.

Formation of Additional Working Groups.

15. An additional Working Group No. XV for Sugar Industry and another No. XVI for Textile Industry, were formed under the Convenerships of the Cane Commissioner, U.P., and the Additional Director of Industries (Heavy Industries), U.P., respectively. The Working Groups separately constituted for the Government Precision Instruments Factory, Lucknow (Group No. XVII), and

the Government Cement Factory, Churk (Group No. XVIII), were also subsequently affiliated to the Committee. The Conveners of these Groups, respectively, were the Engineer Manager, Government Precision Instruments Factory, and the Director, Government Cement Factory.

Material for the Report.

16. Several meetings of Conveners of the Working Groups were held in which the progress of work relating to each Group was generally considered, and the difficulties reported discussed and resolved, as far as possible. We must confess here that completion of the task assigned to the Working Groups and the Committee as a whole was greatly handicaped due to difficulty in collection of statistical data, which had not been readily available. The Working Groups had to contact various sources from which this important data could be had. The object was, however, achieved by constant and strenuous efforts of the Conveners and other members of the Working Groups, and as much information as could be collected was made use of in the nuucleus reports as adopted in this Report.

17. It might be mentioned here that the various recommendations contained in this Report are centred round the programme for development of large and medium scale industries in the State, during the Third Five Year Plan. Ofcourse, an attempt has been made to outline the proposals for the subsequent Plan periods also, as contained in the summary reports of the Working Groups appearing hereinafter, which might be taken as an indication of the future programmes. In the face of various limiting factors obtaining, preparation of a detailed Master Plan for the next fifteen years could have hardly been undertaken at this stage. In this connection, it may be pointed out that the future programmes for industrialisation of the State, would largely depend upon what practically could be achieved in the context of the Third Five Year Plan. A well-conceived and plausible programme for the Fourth and Fifth Five Year Plans of the State, therefore, could only be drawn up in due course after making proper assessment of the achievements during the III Plan period.

18. The various Nucleus Reports prepared by the respective working Groups are given in separate volumes. These reports are based on the general consideration about availability of raw materials, markets and other facilities existing in this State. The break-up of figures in Appendices A to F thereof, is based on the presumption that the project would be taken up for implementation during the Third Five Year Plan. These Nucleus Reports, however, provide only the first information and the figures given therein should be taken as merely tentative estimates. Detailed project reports may have to be drawn up prior to execution of the projects.

19. Since the Fact Finding Committee (Large-scale Industries), U.P., had in its report published during 1956, already dealt with the various matters including resources of the State for industrial development, existing position of large scale industries, difficulties, hindrances, problem of closed factories etc., which appraisals more or less still hold good, we have avoided discussing the same afresh in this Report. However, in making various recommendations as contained in this Report, the conclusions of the Fact Finding Committee have been taken into account, as far as possible.

Meetings of the Committee held.

20. After the exploratory meeting of the Committee held on April 7, 1959, its second meeting was held in the Directorate of Industries at Kanpur on September 29, 1959. The reports submitted to the Committee by the different Working Groups and other material fur-

nished to it, were generally considered and matters of policy determined at this meeting. The third meeting of the Committee was held in Vidhan Bhavan at Lucknow on December 9, 1959, in which the draft of this Report was finally considered and adopted.

Plan of the Report.

21. This Report is divided into 30 chapters. Chapters 1 to 18 contain summary reports introducing the subject matter of nucleus reports prepared by the eighteen Working Groups of the Committee. Chapter 19 deals with industrial research. In Chapter 20, the proposal for establishment of a Design-cum-Research Centre at the Government Precision Instruments Factory has been discussed. Requirement and resources of technical man-power have been discussed in Chapter 21. Chapter 22 deals with the proposal for establishment of U.P. Heavy Industries Corporation. In Chapter 23, we have discussed problems of mineral administration in the State necessitating establishment of a Mineral Development Corporation. Recommendations for earmarking and development of Industrial Areas and Techno-Economic survey of prospective areas for industrial development are contained in Chapter 24. In Chapter 25, we have dealt with the requirements of rail and road transport. Chapter 26 deals with the locational pattern of various industrial projects recommended for being taken up during the Third Five Year Plan. Recommendations for the much-needed incentives for private sector, to enable it to play its role in the industrialisation of the State, are contained in Chapter 27. In Chapter 28, recommendations for reorganisation and strengthening of the Heavy Industries Wing in the Directorate of Industries, U. P., to undertake execution of the entire development programme, have been made. Chapter 29 contains report of the Chief Convener reviewing the Third Plan proposals as a whole, giving details of capital cost, power requirements, foreign exchange component, employment potential and other relevant particulars in respect of the various schemes recommended. The main recommendations of the Committee are catalogued in Chapter 30.

Acknowledgement.

22. We take this opportunity to express our gratitude to all individuals, Technical Experts, Scientistis, Technical and Research Institutions and other organisations who assisted us in our task.

PART---A

SUMMARY REPORTS OF WORKING GROUPS:

1. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'PULP AND PAPER'

With an increase in literacy and general improvement in the standard of living the consumption of paper is on the increase. With a production of 97,908 tons of paper and board in 1948, the production in 1958 amounted to 2,53,008 tons. These figures will indicate that the production has more than doubled in the last decade. This expansion has been achieved by modernisation and expansion of the old units and by the establishment of new mills. According to the Planning Commissions' report (1956—61) on an average the consumption of paper and board has increased by 8% per annum during the past five years and by the end of 1960—61, the demand is estimated to be 3,30,000 tons. The estimated production of paper during the year 1959-60 would be of the order of 2,80,000 tons and taking into account all the new units which have been sanctioned, it will not exceed 3,77,100 tons during 1963-64. On the other hand, the demand which would be 3,30,000 tons during 1960-61, will go up to at least 5,20,000 tons in 1963, according to the estimate which has been made by the Ministry of Commerce and Industry after a very thorough examination of the problem. In other words, the supply would be 50,000 tons short of demand in 1960-61 and by 1963 the gap will increase to 1,40,000 tons. It will, thus, be seen that there is scope for new units being added up to cope with the increasing demand for paper and board.

The cellulosic raw materials required for the paper and board industry are essentially of forest origin or agricultural residues. For a state like Uttar Pradesh with its rather limited mineral resources and no sea coast, the industrial development will depend, among other things, on the judicious and proper utilisation of the forest resources. The forests have been and are still the supplier of the cellulosic raw material, in the form of bamboos, grasses and woods to the pulp and paper industry. In preparing the reports (detailed below) special care has been taken to ascertain as correctly as possible the amount of various cellulosic raw materials and agricultural residues (in the form of sugar cane bagasse) that may be available in the State.

The Working Group on Paper and Pulp had examined the matter in considerable detail. Proposals like manufacture of security paper and high grade filter paper were deferred for subsequent Plans. The demand for security paper is not very high at present. Altogether the demand for high quality filter paper is at present so little as not to warrant the establishment of an economic unit. The Hand-made Paper Centre may be organised on scientific lines and a small unit producing one ton per day may be established. The proposal on hard board has been dealt with by the Working Group on Forest Industries.

The Working Group had to undertake a certain amount of re-thinking with a view to formulate the best utility of the respective raw materials, keeping in view the quantity expected to be available in the State. The recommendations, in order of priority are as follows:—

1. Integrated plant for rayon grade pulp and newsprint from fir, spruce and bagasse.
2. High grade pulp and High grade paper from sunn fibre and rope cuttings.
3. Writing paper from grasses.

4. Writing paper from bagasse and sunn fibre pulp.
5. Writing and printing paper from bagasse and other long-fibred cellulosic materials.
6. Corrugated paper board from straw and bagasse with kraft paper lining.
7. Grease proof and glassine papers from bamboo.
8. Kraft paper from 'Chir' pine.
9. Medium units for ordinary paper from waste paper, bagasse or straw and rags (for cities with a population of more than two lacs).

1. *Rayon grade pulp and newsprint from fir and spruce with bagasse:*—Newsprint is a generic term to indicate paper generally used for the publication of newsprint. The "standard" newsprint consists of a furnish of 80 to 85 per cent mechanical pulp and 15 to 20 per cent chemical pulp made of fir and spruce wood and the essential qualities required of a newsprint are opacity, bulk, softness, quick ink absorbency, adequate strength and cheapness. The newsprint now produced in our country from a furnish of salai (Boswellia serrata) ground wood pulp 60% and bamboo chemical pulp 40% is of sub-standard quality and does not satisfy all the qualities required of the newsprint paper. The Working Group is of the opinion that it should be possible to produce a reasonably good quality newsprint having a composition of 70-80% bagasse chemical pulp, 10-15% unbleached sulphite wood pulp and 20-25% ground wood pulp from fir and spruce.

A scheme for the production of 150 tons per day of newsprint and 50 tons per day of rayon grade pulp has been formulated. The newsprint furnish will have a composition of (i) 60% bagasse chemical pulp (or 30% bagasse chemical pulp and 30% forest grass chemical pulp), (ii) 25% ground wood pulp and (iii) 15% sulphite wood pulp. The dissolving pulp will be produced from good quality sound, debaked fir and spruce wood suitable for the purpose.

For the production of newsprint and rayon grade pulp the amount of air dry fir and spruce wood required would be 27,000 tons and 49,500 tons respectively and the total annual requirement would thus be 76,500 tons. It has been reported to the Working Group that fir and spruce will be available to the extent of 68,000 tons per annum from the Tehri Forest Division. This quantity will be available besides what is at present being used for the production of sleepers. In formulating the scheme it has been assumed that the wood will be available at the factory site at a price of Rs. 100 per ton (air dry) inclusive of all costs and expenditure.

The essential requirements of rayon grade pulp are high alpha cellulose contents, low ash, lignin and pontosan contents, a low alkali solubility and copper number and a high disperse viscosity and uniformity of pulp. It is, therefore, imperative that the coniferous woods employed for the production of rayon grade pulp should be absolutely sound, of good uniformity, should not be over-matured and above all of the same age group.

In recommending a larger unit for newsprint (150 tons a day) and a comparatively smaller unit for rayon grade pulp (50 tons a day), the Working Group has taken into account the view that while the entire amount of the wood will be suitable for newsprint only a selected portion of sound and uniformly ripe wood will be suitable for rayon grade plup.

Considering transport facilities, ease of bringing the wood from the Himalayan forests, availability of water and power, and various other facilities, Saharanpur has been recommended as the suitable site.

2. *High grade pulp and paper from sunn fibre:*—The country is importing a considerable quantity of high grade pulp and high quality paper. The sunn fibre of Uttar Pradesh and other states is mostly exported as raw fibre for being converted into special grades of paper and for rope and twine making. Nearly half of the total export of this fibre is used in foreign countries for paper making. The sunn fibre constitutes an excellent raw material for high grade pulp and paper. In recommending this scheme the Working Group has taken into consideration the fact that the production of high grade paper and pulp will not only serve to arrest the expenditure of foreign exchange to the extent of rupees 187 lakhs, per annum, now required for the purchase of these commodities but will also serve as exchange earner by the export of the pulp to some of the consuming countries.

Since Varanasi is the biggest centre for grading, baling and transport of sunn fibre and since facilities for transport, power, water etc. exist there, Varanasi has been proposed as the suitable site.

The proposal will require a total capital investment of rupees 303 lakhs and will earn a profit of Rs. 42.8 lakhs annually which corresponds to 16.9% of the block capital after meeting the usual depreciation of buildings, plant and machineries and interest on capital invested.

3. *Writing and printing paper from forest grasses:*—It has been reported that paper making grasses to the extent of 140,000 tons can be annually available in the Tarai region of the Nainital district. These grasses have at present no industrial use, and are burnt as a safeguard against fire hazard. The quantity of grasses reported to be available will be sufficient to cater the need of a 140-ton plant. It is to be ensured that the grasses taken are from reserved forests so that their regular supplies are maintained.

There is a growing demand for the supply of cheap grade of writing and printing papers. The present high price of ordinary writing and printing papers will serve as ample testimony for increased production of these papers.

It will be seen from the report that the project requires an investment of Rs. 735 lakhs and will fetch a gross profit of Rs. 11.3 lakhs which amounts to a profit of 16.5% per annum after meeting depreciation on building, plant and machineries and interest on block capital at 5% and 6% per annum respectively. Taking into consideration various facilities for transport, electricity, water, etc., Lalkuan has been recommended as the suitable site.

It has been mentioned earlier, that the grass available will be adequate for a plant of 140 tons capacity. Should actually the above quantity or more be available, then besides producing 100 tons of writing paper per day, the grass could also be pulped and the mill made to serve as a pulp distributing centre for various small units in U. P., Rajasthan, East Punjab and Bihar. The Government of India has envisaged such a pulp plant for distribution to small production units and it is considered that ultimately 10% of the total requirement of paper will be manufactured by such small units. It may be mentioned in passing that there is at present no pulp distribution unit in the country and ours will be a new venture in this respect. The project will open a new industrial avenue for the hill people.

4. *Writing and printing paper from bagasse and sunn-hemp:*—Uttar Pradesh is the largest producer of sugarcane bagasse and, therefore, any industry based on bagasse should come to this state. The paper making qualities of bagasse are now fully recognised.

The estimated production of paper during the current year will be about 280,000 tons against a demand of 330,000 tons. The demand of paper during 1963-64 is expected to be of the order of 520,000 tons against a production capacity of about 377,100 tons. Thus, the supply will be about 50,000 tons less than the demand at the present time and the gap is likely to be about 143,000 tons by 1963 unless steps are taken from now to increase production of the existsing units and to set up new units. There will thus be no denying of the fact that new paper units should be established to meet the growing demand of writing and printing papers.

The scheme envisages the use of a furnish consisting of depithed bagasse pulp 80% and sunn fibre pulp 20%. The scheme further proposes to establish two units one of which will be at a suitable place in the eastern sugar belt of the State.

The Working Group has considered that the claim of the eastern districts of the State for the establishment of the bagasse paper mill deserves special consideration, as the density of population in this part of the State is maximum and the *per capita* income the least. Taking into consideration the various facilities for transport of bagasse from different places, availability of water and power, the Working Group considered that Sardarnagar and Golagokarannath will appear to be suitable sites.

Although the Celdecor-Pomilio process has been recommended in the scheme for the pulping of the bagasse, the Working Group felt that before final selection of the plant, other processes of pulping can be considered.

The scheme under reference will require a capital expenditure of Rs. 429.1 lakhs and will earn a gross profit of Rs. 65.7 lakhs per annum which amounts to 17.3% on total block capital investment, after accounting for the usual depreciation on buildings, plant and machineries and interest on the capital investment.

5. *Writing and printing paper from bagasse and other cellulosic material:*—Besides the bagasse and sunn fibre plants proposed at Sardarnagar and Golagokarannath, the proposal is to have four more paper units, one each at Mansurpur, Hargaon, Ramkola and Basti, based on the utilisation of bagasse sulphate pulp and long fibred soft wood pulp from the pine wood by the sulphate process. The paper produced will be suitable for writing and printing of which there is at present an acute shortage. The production capacity of each unit will be 50 tons a day, or 15,000 tons of paper annually.

The F. O. B. price of the plant and machinery would be about Rs. 220 lakhs and the foreign exchange requirement of which would be of the order of Rs. 176.2 lakhs. The block capital and working capital requirements for the 50 tons/day writing and printing paper mill would be Rs. 323.4 lakhs and Rs. 40 lakhs respectively.

The gross annual profit has been calculated as Rs. 54.37 lakhs which is equivalent to 16.8 per cent on the total block investment of rupees 323.4 lakhs. The estimated sale proceeds from 15,000 tons of paper would be Rs. 195 lakhs and, therefor potential annual saving of foreign exchange would be Rs. 130 lakhs.

6. *Corrugated board:*—India is annually importing corrugated board of *C. I. F.* value of about Rs. 6.05 lakhs. Corrugated board is used in the manufacture of containers for fragile articles and its use is bound to increase with increase in industrialisation and standard of living. It is proposed to establish a corrugated paper board unit based on the utilisation of straw (available in plenty in the Tarai-Bhabar area) and bagasse. The tentative location has been suggested either at Kicha or Rudrapur. The capacity of the unit will be 25 tons a day, out of which 20 tons will be the corrugated board and this is to be reinforced by 5 tons of kraft paper as lining. The *F. O. B.* price of the plant and machinery will be about rupees 63.8 lakhs out of which the foreign exchange requirements will be about rupees 51 lakhs. The total cost of the installed plant will be rupees 82.1 lakhs. The block capital and working capital requirements would be Rs. 109.1 and Rs. 10 lakhs respectively. The project is estimated to show a gross annual profit of rupees 30.3 lakhs amounting to 27.8% profit on the block capital investment of Rs. 109.1 lakhs. The project is expected to give a direct employment to 273 persons.

7. *Grease proof and glassine paper:*—There is a demand for these two grades of paper and the present requirement of the country is met by import. It is proposed to produce these two grades of paper by semi-chemical neutral sulphite process from bamboo. Adequate quantity of bamboo is available in the Varanasi—Mirzapur area for the establishment of a 10 ton plant. The tentative site proposed is Dudhi (Mirzapur). The total cost of the plant is estimated at Rs. 75 lakhs out of which machinery worth Rs. 60 lakhs would be foreign. The installed cost of the plant is expected to be Rs. 96.6 lakhs. The block capital and working capital requirements of the project would be Rs. 139.6 lakhs and Rs. 10 lakhs respectively. The gross annual profit is estimated to be Rs. 37.92 lakhs which amounts to 29.3% on the total block capital investment. The annual saving in foreign exchange would be the *C. I. F.* value of grease proof and glassine paper worth Rs. 76 lakhs that is Rs. 61.5 lakhs.

8. *Kraft paper from chir pine:*—With the restriction of import of old newspaper in the country, a shortage in the packing and wrapping material is being felt. It is proposed to establish a kraft paper mill to produce wrapping and bag papers from the pine wood available in the Garhwal forests. The capacity of the proposed unit will be 50 tons a day and the tentative location suggested is Rishikesh. For a 50 ton kraft paper mill, the estimated cost of plant and machinery will be about Rs. 265 lakhs and out of this amount foreign exchange requirement for plant and machinery will be about Rs. 212 lakhs. The installed cost of the plant will be rupees 315 lakhs. The block capital and the working capital requirements would be Rs. 397 and 40 lakhs respectively. The scheme envisages a gross annual profit of rupees 81.5 lakhs which amounts to 20.5% on the block capital after meeting depreciation on building and plant as well as interest on the block capital and working capital.

9. *Medium units for ordinary paper from rags, waste paper and straw or bagasse:*—It is proposed to have eight units, one each in the KAVAL towns and Meerut, Aligarh and Bareilly. The raw material will be rags 20%, waste paper 20% and straw or bagasse pulp 60%. The rags and waste paper are to be collected locally. The pulping of straw and bagasse will be carried out in the hydropulper. The paper is expected to be consumed locally. There will be no recovery of pulping chemicals and effluent will be discharged (if necessary, after suitable dilution) to the rainwater nullas or city drains. Since bagasse and straw produce almost similar type of pulp, shortage of one can be made up by the other. Waste paper pulp will increase the quantity of the pulp (as the

capacity of the unit is 10 tons a day) and the presence of 20% rag pulp in the furnish will contribute to the strength of the paper.

I am grateful to all the members of the Working Group for their help and co-operation and for supplying the Group with valuable technical information. My thanks are specially due to Sri M. P. Bhargava, who in spite of his old age and various other important engagements has rendered unique service to the Group and has placed his vast experience of paper industry and technology at the disposal of the Group.

The following items were deferred for the fourth and fifth plans:—

1. High quality, filter paper.
2. Security papers.
3. Newsprint and writing paper from 100% bagasse.
4. Viscose Rayon grade pulp from bagasse.
5. Special type of particle board and chip board.
6. Hardboard from bagasse.
7. Tissue & Cigarette paper.
8. Coated paper.

Dr. J. B. LAL,
Head of the Chemical Engineering Section and
Industrial Chemist to Government, Uttar Pradesh.

2. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'CERAMICS'

Ceramics in its broadest meaning, include all the Silicate Industries, such as glass, enamels, refractories, whitewares and cement. These industries play a very vital role both in the growth of other basic industries such as steel, construction of dams, and hydro-electric projects, power transmission and as consumers items helping sanitation and better living standards. It is because of this dual role that Ceramic Industries are now closely linked with our development plans.

GLASS INDUSTRY

Glass Industry of India is now fairly developed and the country is more or less self-sufficient in all the items except some type of specialised products such as borosilicate glass used in the manufacture of scientific glass ware, optical glass and fibre glass and its products.

U. P. has also kept pace with development of this industry and enjoys very prominent place. Though U. P. ranks first in the field of hollow-ware, and has no rival in the field of bangle production, it is lagging behind in the field of mechanisation. It has one sheet glass plant, oldest sheet glass plant of India, and one container ware plant, which is lying closed because of financial troubles. There is ample scope for mechanisation in these fields and even after starting the closed plant at least two more units can easily be started in U. P. Recently one unit for container plant has been licensed and it will come in production in the first year of Third Five Year Plan. It is hoped that one more unit will also come into being in the III Five Year Plan. U.P. has all the advantages of healthy growth of the Glass Industry. Sand, a major raw material, is available in plenty and another important material, soda ash, is now being manufactured at Ramnagar. U. P. is famous for its supply of skilled and unskilled labour to glass industry all over India. U. P. has the advantage of enormous market in the State itself and is advantageously situated for Northern market.

So far, boro-silicate glass is not manufactured in the State. Looking at the ever increasing demand of scientific glassware, borosilicate tubes and rods, it is proposed to put up two units for manufacture of this item. U. P., having other advantages of raw materials and availability of skilled labour, will be the right place for such a unit.

U. P. has monopoly of supplies of sand to glass industry. Shankergarh and Bargarh area meets more than 75% of sand requirement of India. For the present all first quality sand quarries are worked and huge deposits of second quality sands are neglected. It is very essential that mineral wealth of the country should be properly utilised and conserved. Experiments on pilot sand washing plant now established at Shankergarh have shown that these sands after benificiation become as good as first quality sand. Thus it is proposed to put up two Sand Washing units, one at Shankergarh and the other at Bargarh, with a capacity of 100 tons each per day. These Plants will open up working of huge deposits of second quality of sand.

REFRACTORIES

Refractories have now assumed the top-most place in the vital industries of the country. Steel Plants cannot function without this basic material. For every 10 tons of steel, one ton of refractory is consumed. It is estimated that by the end of III Five Year Plan, the total requirement of refractories will amount to 1 million tons, against the present capacity of only 0.4 million tons. Refractories to the tune of Rs. 2 crores were imported from January to September 1958.

Refractory factories are all concentrated in Bihar and West Bengal, because of availability of fire clay, quartzite and coal. With the recent finds of high quality refractory clay in Bansi, Distt. Mirzapur, and with the proposal of Garhwa Road-Churk rail-link, which will bring coal from Daltongunj nearer by about 100 miles, good prospects for the development of this industry are opened up in U.P. Fortunately good quality of quartzite and sillimanite are also available nearby. No unit worth its name exists in the whole of northern India. Thus it is proposed to put up one Refractory Plant, with a capacity of 34,000 tons per year at Pipri (Mirzapur). This unit will save foreign exchange to the tune of Rs. 32 lacs and will open up huge potential for employment in poverty-stricken eastern areas of the State.

Mention may also be made of the important findings of Magnesite in Almora District. Magnesite is used as basic refractory in Steel Plants and hence has assumed a great importance. After proper investigations and other facilities, such as power, transport, etc., being made available, it will offer good prospects for making Dead Burnt Magnesite. It is proposed to put one unit with a capacity of 30,000 tons per year for making dead burnt magnesite in Almora district. This will save foreign exchange to the tune of Rs. 40 lacs.

CEMENT

Cement is also a vital industry for the growth of the country both for construction of dams for hydro-electric projects and irrigation and also construction programme of various industries and housing programmes. Cement industry is now fairly developed in other states of India. However, U. P. is very much behind. Whereas states of Bombay and Madhya Pradesh have per capita production of 33 and 41 kgms., respectively, U. P. has only 7 kgms. to her credit. Good quality limestone, basic material for cement, is available in plenty in U. P. and it is not in any way at disadvantage with respect to coal, compared to M. P. and Bombay. U. P. has only one cement factory—Govt. Cement Factory Churk, which has proved to its credit that cement can be produced economically as is done elsewhere in the country in well established factories. It is proposed to put up a big unit, in Western part of U. P. for equitable production and distribution of this product with a capacity of 700 tons per day. This unit may be taken up in public sector, if there is no response from private sector. Three smaller units each with a capacity of 200 tons are proposed under private sector, at Lucknow, Unnao and Rae Bareli respectively, utilising local marl deposits.

WHITEWARES

Production of whitewares, commonly known as potteries, is classified in the following sub-groups.

1. Crockery.
2. Sanitary ware.

3. Electrical porcelain.

4. Chemical porcelain.

Consumption of whitewares is taken as an index of civilisation. With the improvement in the economical conditions of the country and the standard of living there will be a tremendous increase in the consumption of the products of whitewares. Some of the products such as electrical porcelain also play a vital role in the development and transmission of power whereas the products of chemical porcelain are very essential for the development of science. The most essential factor which leads to the setting up of this industry is the market. These items, being fragile and bulky in nature, demand that there should be minimum transport of the finished products.

The main raw materials for these products are clay, quartz and felspar. There are indications in the recent reports of the Directorate of Geology and Mining, U.P., that good quality quartz and felspar occur in Banda Distt. and some deposits of china clay also are reported to occur in the district. U. P. with its huge population and with its central location, offers a good scope for the development of these consumers items.

1. *Crockery*:—Taking into consideration the huge consumption potential of U. P. and its nearness to markets of Northern India, a project is worked out for setting up of a unit for making porcelain crockery at Agra in U. P. It may be added that so far porcelain crockery is not being made in India. Though with the heavy import restrictions import of these items is very negligible, it may be mentioned that huge quantities of porcelain crockery were imported in India both from U. K. and Japan before these restrictions.

2. *Sanitary ware*:—U. P. has the largest number of towns and with the general economical development of the country, sanitary conditions of the State have got to be improved. This would mean huge requirement of sanitary wares such as urinals, commodes, bath room wall tiles and stone ware pipes for the systematic drainage. Looking at the good markets of Northern India and availability of pottery skill in the Western part of U. P., it is proposed to put up one sanitary ware plant near about Khurja. It may be added that so far no such sanitary ware factory exists in Northern India. Utilising local clays, it is proposed to set up one stoneware pipe unit in Banda Distt. and one in Western U. P.

3. *Electrical porcelain*:—With the projects regarding electrification of the country, electrical porcelain has assumed a great importance. Huge amounts of High and Low Tension Insulators are required for the transmission of power. Unfortunately, the country has lagged behind in the production of electrical porcelain and huge quantities of imports had to be allowed in order to cope up with the power transmisison. Insulators worth Rs. 1 crore were imported in the year 1958. With the further development programmes for electrification of the country in the III Five Year Plan, it would be better to plan right from the beginning the manufacture of insulators. With the electrification projects both in the State and in Northern India where no such unit exists it is very essential that one such unit should be put up in U.P. It is proposed to put up one unit with a capacity of manufacturing 2400 tons per year, for the manufacture of High and Low Tension Insulators either in Banda Distt. or in Mirzapur Distt. The main raw materials, quartz and felspar are available in Distt. Banda, whereas good quality china clay will have to be obtained from outside the State. The coal, with the development of

Daltongunj coal fields and the completion of Garhwa Road rail link, will be obtained from a distance of 150 miles or so and this bottleneck would be further eliminated once the Singrauli coal fields are developed. The setting up of this unit would help the country to save foreign exchange to the tune of Rs. 15 lacs.

I am able to put the above thinking of my Working Group after thorough deliberations in the two meetings which were held at Kanpur and also the continuous flow of correspondence with each member of the Working Group. The Working Group after thorough discussions has recommended the projects as per proforma "X" to be implemented for the III Five Year Plan. The Working Group deferred the following projects for the 4th and 5th Five Year Plans:—

1. Cement Factory for Eastern U. P.
2. Chemical porcelain.
3. Spark plugs.
4. Glass wool.
5. Cement Fondu.
6. Grinding wheels and abrasives.

I take this opportunity to thank the members of my Working Group who, inspite of their heavy pressure of work in their own fields, were kind enough to come to Kanpur to attend the meetings, who were prompt in giving the required information and who helped me in putting before the members of the Main Committee the nucleus reports on the various proposals to be taken up for III Five Year Plan.

I also express my deepest gratitude to Dr. S. P. Varma, Development Officer (Minerals), and Mr. N. R. Srinivasan, Deputy Development Officer (Minerals) for their assistance in preparation of this Plan.

K. H. PARIKH
Glass Technologist to Govt. U. P.

3. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'FERMENTATION INDUSTRIES'

For several decades it has been known that numerous kinds of yeasts, molds and other lower fungi, and several types or groups of bacteria have direct relation, either favourable or unfavourable, to certain types of economic processes carried out in connection with industrial or factory operations such as brewing, wine making, cheese making, etc., which have grown up from small-scale or family arts. Knowledge in this field has greatly extended in recent years, as research in many countries and in many lines has been carried out. The scale of operations has greatly enlarged and concentrated in manufacturing plants. Industries have replaced household arts. These changes have made it evident that industrial microbiology is not only an exceedingly interesting branch of study but that it has already become a distinctly important branch of applied science and one with even greater potentialities.

In any broad-gauge discussion of applied microbiology it should be emphasised at the outset that knowledge in this field is of usefulness and significance from two diametrically opposite angles of application. On the first and more positive side, it is clearly advantageous to know the biological and biochemical characteristics of the many types of organisms that are the prime and direct causes of chemical transformation of materials into desired products. Here one utilise the microorganisms capable of producing by fermentation processes relatively large quantities of chemical substances of usefulness and economic value. In this type of process the biochemical methods are in some instances the only economic methods of production. The manufacture of industrial alcohol and other industries based on alcoholic fermentation may be taken as a type of this class. Of equal interest to the microbiologist is the part played by organisms of these groups in composite operations, where the action sought is the production of somewhat smaller quantities of desirable by-products that should occur only as minor but important components in the final product. This is the aim in some branches of food manufacturing and in other commodity products.

On the other hand, it is recognised that fermentations incited by microbes may not always be desirable but may be quite the reverse. Competition by invading contaminates may wreck what would otherwise be a successful process. It is, then, of much importance to have knowledge of the organisms specifically useful in a process, and to be equally informed regarding those which are often destructive to or detrimental in manufacturing processes and are the causes of economic loss. Because of improved knowledge in the science and technique of fermentation, a knowledge for which one must ever remain indebted to personalities like Pasteur, it is now possible to use fermentative methods for the manufacture of a wide range of chemicals like butanol, acetone, acetic acid, citric acid, gluconic acid, vitamins, antibiotics etc. Industrial Microbiology thus has become a very well developed science in those countries.

In India, however, this branch of science is still in its infancy. The only fermentation industry which one can speak of in our country is that of industrial alcohol. Even in this case while beverage alcohol was being manufactured for a pretty long time, no attempt was made for the production of industrial alcohol until 1930. The exigencies of war during

1939-44 however afforded an opportunity for the development of the alcohol industry. Intensive enemy blockade having made it almost impossible for regular petrol supplies to reach the Indian front, the British Government were forced to encourage establishment of alcohol distilleries in India so as to provide a supplementary fuel. Thus during a period of 10 years, *i.e.*, between 1940-1950 almost a dozen new plants were started in the country, most of them being located in Uttar Pradesh which naturally became an automatic choice because of its immense raw-material potential in the form of sugar factory molasses. Utilisation of molasses in this manner was almost a heavenly gift for the sugar industry also, which was finding it a great problem in disposing of its waste molasses. Not only was thus a headache cured but industry even got an additional source of income by sale of molasses.

Since the war years, thus, there has been a regular progress in the alcohol industry of India particularly that of Uttar Pradesh which with its present installed capacity of 17.7 million gallons per year produces almost as much alcohol as all other States put together.

Most of the alcohol produced in Uttar Pradesh is being used as a supplementary fuel in admixture with petrol, and it is designated as Power Alcohol. As mentioned before, Power Alcohol was used for the first time in India in 1940. With the encouragement provided by the Indian Power Alcohol Act of 1948 its consumption has reached a figure of about 8 million gallons per year. Such a use of alcohol results in some savings in foreign exchange and also helps to maintain a ready source of indigenous motor fuel during times of emergency.

It is, however, being realised, of late, that use of Alcohol as motor fuel should be restricted for times of emergency only, because this chemical can be harnessed as a raw material for the manufacture of many useful products which at the moment are being entirely imported. Utilisation in this manner is sure to add to our savings of foreign exchange. The Working Group on Fermentation Industries of the Heavy Industries Plan Committee went into a careful study of this problem and came to conclusion that production of alcohol based chemicals like butanol, acetic acid, ether, acetone, diacetone alcohol, ethylene dichloride, acetic anhydride should be taken up in our country as well. In most of the foreign countries this is being practised and the technique for their production is in a well-advanced stage, even full chemical-engineering details being available. It may perhaps, be necessary to get foreign plants and machinery in the earlier stages, but this expenditure on foreign exchange need not be grudged because the sale of the products manufactured in this way will, in effect, lead to an ultimate saving. The Alcohol Committee Report of the Government of India gives an exhaustive list of chemicals which could be manufactured from ethyl alcohol. Because of limitations in respect of finance, foreign exchange, power etc., no doubt, production of all these items cannot be implemented simultaneously, yet the Working Group was of opinion that at least the following five items could certainly be taken up in the Third Five Year Plan:—

(1) Butyl Alcohol.

(2) Diacetone Alcohol.

(3) Acetone.

(4) Acetic Acid.

(5) Synthetic Rubber.

Huge quantities of the above materials are being imported into India annually thus causing a great drain on foreign exchange, and it is absolutely necessary to initiate their manufacture in India. Uttar Pradesh naturally would be the most suitable place for establishing these industries because the chief raw material required in their case—alcohol would be readily and cheaply available here.

It is being whispered in some quarters that synthetic rubber may, perhaps, be cheaper to be produced from the waste gases of petroleum refineries of Bombay and Calcutta, rather than from ethyl alcohol. It is not our intention to go into discussion about the same, but it is necessary to point out at once that unless this industry is established in Uttar Pradesh and alcohol utilised as a raw material a lot of the installed capacity of our distilleries may remain idle for many years to come. As it is, there is wide gap between installed capacity and actual production. It is expected that by the end of the Second Five Year Plan our alcohol distilleries will be able to manufacture 20 million gallons of alcohol. At present, however, only half of this capacity is being utilised. While there may be other causes for this low production, it is none the less also true that one of the main reasons for the same is the poor off-take of the product. Utilisation of more alcohol as motor fuel is certainly not the proper solution. The only solution lies in establishment of industries based on ethyl alcohol—synthetic rubber being foremost because it is likely to utilise alcohol to the extent of 14 million gallons per year. In countries like ours, where the entire economy demands fullest utilisation of agricultural wastes like molasses, it may, therefore, not be wrong at all to utilise alcohol as a raw material for rubber manufacture even if the process may be slightly expensive. After all, there being quite a big margin between the cost of production and the sale price of synthetic rubber, utilisation of alcohol in place of butene can, at best, reduce the margin of profit to some extent. Our Working Group was, therefore, quite convinced that manufacture of butadiene from ethyl alcohol must find a place in the Third Five Year Plan. This will give a great impetus to our alcohol industry by utilisation of the full production capacity of each unit. It may then even be necessary to increase the production capacity of alcohol. The Wroking Group has suggested the establishment of five new Power Alcohol units each of an annual capacity of 1.5 million gallons, to meet this eventuality.

According to Government plans sugar production is also to be increased in the Second and Third Five Year Plans. This will pour in an additional quantity of molasses the utilisation of which also has to be systematically planned. In other countries, their fermentation industries not only cater for alcohol production but other useful chemicals like citric acid, acetic acid, gluconic acid, lactic acid, antibiotics, acetone and butanol etc., are also being manufactured by fermentative methods. All of the above mentioned products, however, may be a bit difficult to be produced by direct fermentation of Indian sugarcane molasses because of the high inorganic salt content of the same. Yet it is also true that our molasses is quite suitable for products like acetic acid and citric acid. The Working Group, therefore, has suggested that small plants of a capacity of about 1000 tons per year may be established for acetic acid manufacture. It is to be stated that these plants will be most suitably located in Deoria, Basti and Muzaffarnagar districts of our State where there are many sugar factories and where there is sometimes an accumulation of molasses even after meeting the requirements of the neighbouring distilleries.

However, it is noted that there exists a sort of monopoly in Citric Acid production in the hands of a few foreign firms who control the entire production and supplies. It is, therefore, not easy to get any help in this manufacture from foreign countries. In case private parties are able to negotiate foreign association, the item may be successfully implemented. On these considerations, it has been given a rather low priority.

One item which in the opinion of the Working Group needed particular consideration by the Government was food yeast. Yeast is well known source of proteins and vitamins. During the second world war, this material was extensively used as a supplementary food for the armed forces. In India its use is, at the moment, a bit limited. It is, therefore, necessary to have Governmental help in order to popularise the use of this very useful food. The Working Group suggests that free distribution of yeast in schools, as also its compulsory use in the diet of jails, be practised.

A plant of 500 tons per year of food yeast should be put up preferably as a sister concern of a brewery or grain distillery both of which produce yeast as a by-product in their normal working, so that additional machinery only for separation and drying of the product becomes necessary.

On the basis of the considerations detailed in the preceding pages, the Working Group on Fermentation Industries, therefore, finally recommends that, besides the synthetic rubber project, the following items may be taken up in the Third Five Year Plan and a nucleus report in respect of each has also been prepared.

1. Butadiene.
2. Butyl Alcohol.
3. Diacetone Alcohol and Acetone.
4. Acetic Acid.
5. Power Alcohol.
6. Food Yeast.

When the manufacture of these items has been successfully arranged, other fermentation industries and alcohol based products could be taken up in the 4th and 5th Five Year Plans. As has already been mentioned earlier in this report, items like gluconic acid, mercury fulminate may thus have to wait for the succeeding plans. One particular item which has already received attention of planners during the 1st and 2nd Five Year Plans and which was suggested for being taken up in the 3rd Plan, was 'Recovery of Potassium Salts from Molasses'. The Working Group on Fermentation Industries examined this problem in great detail and came to the conclusion that this item also will yet have to be postponed to the 4th or 5th Plan because certain technical difficulties have yet to be solved.

W. R. DAMLE,
Alcohol Technologist to
Government, U. P.

4. SUMMARY REPORT FROM THE CONVERNER OF THE WORKING GROUP ON ‘PLASTICS AND ALLIED INDUSTRIES’

A Working Group was formed to investigate the possibilities of establishing manufacturing units for Plastics and Allied Products. Under the perview of the Group, the following units were placed for consideration:—

1. Cellulose Acetate Rayon and Plastics, including Cellulose Acetate Butyrate.
2. Raw Films.
3. Polythene.
4. Polyvinyl Acetate.
5. Polyvinyl Chloride.
6. Nitro Cellulose for lacquers.
7. Urea Formaldehyde Resins.
8. Phenol Formaldehyde Resins.
9. Melamine Formaldehyde Resins.
10. Furfural.
11. Nylon.
12. Terylene.

The first meeting of the Group was held on 30.5.59 at Government Textile Institute, Kanpur. It was decided to recommend the establishment of the following units in the Third Five Year Plan and to prepare the preliminary nucleus reports in respect of them:—

1. Cellulose Acetate Rayon and Plastics.
2. Polyvinyl Chloride.
3. Polythene:
    - (a) High Pressure;
    - (b) Low Pressure.
4. Raw Films.
5. Furfural.

For the manufacture of items 1, 2, 3 and Polyvinyl Acetate, the main raw material is alcohol which is available in plenty. Further for item (1) Cellulose Acetate Rayon and Plastics, another raw material is cotton linters which can be easily available in U.P. and the neighbouring districts of East Punjab.

Regarding Cellulose Acetate Rayon it can be pointed out that there is only one factory in India in Andhra Pradesh which is manufacturing Acetate Rayon with a target of 8 million pounds per annum by the end of the Second Five Year Plan namely 1961. This forms only 11.8% of the total artificial fibres produced, the remaining 88.2% being viscose rayon. Further cellulose acetate moulding powder can also be manufactured as the import of this material amounts to Rs. 2.4 millions. It is anticipated that in the coming years more and more plastic materials will be used and the demand may grow still further as the world is passing through the Plastic age. It has further been recommended by the Working Group that as the 'know how' of this industry exists with the Sirsilk Ltd., Kaghaznagar, Andhra Pradesh, managed by M/s. Birlas, it will be advantageous if they are invited to establish this industry in U.P., assuring them of all possible assistance. The location of this industry should be at a place in western U.P. so that the raw materials like alcohol and cotton linters are easily available from nearby places of East Punjab. Meerut District may be considered.

For the establishment of raw film industry, the raw materials are the same as for cellulose acetate but one more chemical will be required to be imported, namely methylene chloride. In the manufacture of raw films the process will be identical to that of cellulose acetate with a slight modification. The plastics will be drawn in the form of sheets of required thickness. For this also foreign collaboration will be required either from Japan, Germany or U.S.A.

Coming to the establishment of Polythene, it may be pointed out that the only raw material required is alcohol which is available in abundance in U.P. Though there are two factories manufacturing Polythene, yet due to its properties more of this plastic will be required for industrial purposes. The present import is to the tune of Rs. 6.2 millions. There are two processes by which it can be manufactured, namely 'High Pressure' and 'Low Pressure' technique. The latter technique has been adopted by I. G. Farbon, West Germany and Phillips Chemical, U.S.A., and is also cheaper. Hence collaboration with either of these two will be worthwhile.

It is suggested that the High Pressure Polythene Plant may be set up at Bareilly in collaboration with Dow Co. of America, who possess the necessary technical 'know how'. Another Polythene factory can be had in Gorakhpur Division or in Western U. P. where alcohol can be available. This factory will have to produce polythene of low pressure technique. As stated earlier this Low Pressure technique is practised in Germany by I. G. Farbon and Phillips of America. Collaboration with either of the countries is suggested.

As regards Polyvinyl chloride it may be said that the process of manufacturing vinyl chloride from alcohol has been worked out successfully on a pilot plant scale by Sri Ram Industrial Institute and M/S Delhi Cloth Mills Chemicals who are contemplating to put up a plant either in Delhi or in any place in U.P., if all the facilities are given. The foreign assistance as regards equipments and technical 'know how' is partly required, namely for the polymerization of vinyl chloride. The capital expenditure involved for this industry is much less than that required for the two previous projects. The import figure for this plastic is Rs. 4.5 millions.

This industry may be located in Eastern U.P. at a place where alcohol is easily available and where there is caustic soda industry so that the chlorine byproduct of the industry, is utilised for the manufacture of polyvinyl chloride and the hydrochloric acid which is also a byproduct of this industry can be utilised for the manufacture of Dicalcium Phosphate.

Another scheme for the manufacture of Furfural from agricultural waste is also suggested. Furfural as such finds a number of uses. Further it forms a raw material for the manufacture of Nylon filaments and plastics. The technical 'know how' for the same is with Du Pont of America. The project for the manufacture of 3000 tons of Nylon filaments and plastic may cost about Rs. 500 lakhs.

The items, as discussed below, were deferred for subsequent plans.

As regards polyvinyl acetate the basic raw material required is alcohol. After the industry for the manufacture of Acetic anhydride and acetaldehyde is started, polyvinyl acetate will be one of the by-products and it is suggested that the manufacture of acetaldehyde, acetic anhydride, glacial acetic acid, polyvinyl acetate and cellulose acetate could then be carried out at the same place so that the whole unit as such will prove very economical.

There is a demand for the Cellulose Acetobutyrate plastic also. The project will cost a little higher than that of Cellulose Acetate, though the plant and equipments will be the same. The additional raw materials required will be acetobutyric anhydride and methylene chloride which are costly.

As regards Terylene it was felt that as it is a new industry from the view point of synthetic fibres, it may be worthwhile to contact Imperial Chemical Industries (who are the pioneers and inventors of this plastic) to start a factory in U. P. early in IV Plan. One of the raw materials needed—ethylene glycol—could be obtained from alcohol.

As regards other plastics like Urea formaldehyde the Working Group was of the opinion that unless the raw materials required are first manufactured in India it is not worthwhile to undertake the manufacture of these items. In the Fourth Five Year Plan, after developing the manufacture of raw materials like Formaldehyde from methanol or wood spirit, the proposal for Urea formaldehyde resin and moulding powders may be considered.

As regards the manufacture of Nitro Cellulose for lacquer industry, the Working Group was of the opinion that as the Government Cordite Factory in its expansion programme is going to manufacture nitrocellulose for lacquers along with nitrocellulose explosives the progress may be watched and if at all necessity arises to meet the demand then it may be taken up in the Fourth Five Year Plan.

The Working Group was also of the opinion that during the subsequent plans it will be advantageous to take up the production of other important plastics like melamine formaldehyde, phenol formaldehyde, furan resins etc.

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5. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'HEAVY CHEMICALS AND FERTILIZERS'.

Introduction:—The Working Group held six meetings and arrived at certain important decisions summarised as follows:—

The State of Uttar Pradesh has been very backward in the development of Fertilizers and Heavy Chemical Industries and lags far behind other States in this respect.

Only very small units for the production of Sulphuric, Nitric and Hydrochloric acids exist. Kanpur Chemical Works can be graded as a semi-large scale chemical factory in the State. The other units are minor ones and are working on a small scale. Recently, J. K. Rayons have set up a 25 ton contact Sulphuric Acid Factory at Kanpur for the rayon industry and for manufacturing alums or super-phosphates.

M/s. Sahu Chemicals have established a most modern large scale chemical factory for the manufacture of 40 tons of Ammonia per day for the production of 120 tons/day (or 40,000 tons per annum) of Soda Ash and Ammonium Chloride each. It is the only chemical factory of a large size in the State.

The State consumes large quantities of fertilizers for cultivation purposes and heavy chemicals for a number of consumer industries, *viz.*, paper, textiles, rayon, leather, engineering industries, fine chemicals, glass and soda sillicate, soaps, oil refining, pigments, etc. and it has to import them from foreign countries and other States. The State is the biggest one in respect of population and covers the second biggest area in the country. It is a very big consumer market. Raw materials for all the large scale chemical industries exist to some extent in the State and the setting up of these factories in the State is justified. The difference in the cost of raw materials and finished products is so great that even if a part of the raw materials have to be imported from the neighbouring States or abroad, it will be profitable to manufacture the final products as market potentialities are great.

NITROGENOUS FERTILIZERS

(Need for Chemical Fertilizer Factories in U. P.)

Introduction:—Considering the enormous agricultural development programme in the country and in the State of Uttar Pradesh during the II and III Five Year Plans, there is need for three factories in the State for the production of nitrogenous chemical fertilizers. The greatly increased use of fertilizers is also justified by an increase in the acreage under irrigation. U.P's. irrigated area of 16 million acres in II Plan is going to be increased to 19 million acres in III Plan. According to the estimates of the Ministry of Food and Agriculture, the requirements of nitrogenous fertilizers will rise from 150,000 tons fixed nitrogen to 470,000 tons of nitrogen by the end of 1960-61, which is equivalent to 2.2 million tons of amonium sulphate. It is estimated that the requirements for nitrogen by the end of the III Five Year Plan will be 1.25 million tons, which is equivalent to 5.96 million tons of ammonium sulphate (21% nitrogen). The Government of India have already taken decision to licence and establish capacity to the extent of 7,50,000 tons of nitrogen by the middle of the III Five Year Plan, and they are planning to create an additional capacity of 500,000 tons in the last two or three years of the III Five Year Plan in order to achieve a taget of 1.25 million tons of nitrogen.

By the end of III Plan, total requirement of nitrogen for U. P. is 0.25 million tons, while this State is producing only 0.01 million tons at Sahu Chemical factory. Thus there is a deficit of 0.24 million tons nitrogen. Since average production of one standard unit is 70,000 to 80,000 tons of nitrogen this would mean that three new factories should be located in U. P. U. P.'s case is further justified by the following nitrogenous fertilizer consuming data prepared zone wise by the Fertilizer Committee of the Government of India:

According to the report of the Fertilizer Committee the entire country has been divided into 3 zones, details of which are given on pages 77 to 79 of the Report. The estimated requirement of nitrogenous fertilizer in terms of 'Nitrogen' of these 3 zones is given in the enclosed table 'A'. In this very table details of production of fertilizer in terms of 'Nitrogen' in the various factories which are under erection are also given. The position of this table can be summarised as hereunder:—

Zone	Expected consumption of Nitrogen by 1960-61.	Expected production from the plans sanctioned.
I	1,13,500 tons	90,000 tons.
II	75,600 „	90,000 „
III	1,83,900 „	3,34,000 „
	3,73,000 tons	

This clearly indicates that Zone no. I is deficient while Zone No. II would be surplus by about 20% and No. III would be surplus by nearly 90%. It is true that against the expected consumption of 3.73 lac tons of 'Nitrogen' in 1960-61, the consumption would increase to about 12.5 lac tons by 1965-66; but the relative consumption for different zones is likely to remain the same. 'Although there is margin for expansion in Zone II and Zone III but so far as Zone No. I is concerned, it is already in deficit and this deficit would considerably increase during the III Plan unless immediate steps are taken for the establishment of fertilizer units in Zone No. I. No doubt Government of India are arranging for the distribution of fertilizers according to the requirement of different States but certainly it will involve a higher strain on the rail-ways and the ultimate cost of the 'Nitrogen' per ton to the cultivator will be higher by way of distant movement of fertilizers from one area to another. In view of the above, it is apparent that the location of future fertilizer factories should be so planned that long distance transport is avoided and the ultimate cost to the cultivator is the cheapest.

Uttar Pradesh is second in the list of States consuming nitrogenous fertilizers. Only the consumption of Punjab is higher being about 64,000 tons as against 44,000 tons for U. P., Madras, Andhra, Bihar and Madhya Pradesh come next. Nangal Fertilizer is already coming up in Punjab, Nevyeli in Madras, Sindri is situated in Bihar while U. P. is the only place which inspite of being a big consumer of nitrogenous fertilizers has got no factory worth the name. It is only recently that M/s. Sahu Chemicals have commenced production and they will be producing about 10,000 tons of nitrogen in the form of Ammonium Chloride against the anticipated requirement of about 2.5 lac tons by the end of the III Plan period. From the above, it is apparent that there is a very strong case for the establishment of 3 nitrogenous fertilizer factories in Uttar Pradesh—one in western or central U. P., at Agra, Mathura or Hathras or Sitapur and the other in eastern U. P. at Shahganj or Gorakhpur or Chopan. The third one may be the expanded unit of Sahu Chemicals at Varanasi.

Apart from Ammonium Sulphate, which is now largely used in India, the Government have accepted Nitro-limestone (20.5% nitrogen), Sulphate-Nitrate (26.0 to 26.5% nitrogen), Urea (44 to 46% nitrogen) as suitable fertilizers. The use of Ammonium Chloride as fertilizer has also been tried. They also recommend compound fertilizers say Nitro-phosphate or Ammonium Phosphate-Nitrate.

Nitrogen Fertilizers:—Since the beginning of the use of chemical fertilizers in India, the only nitrogen fertilizer known to farmers has been ammonium sulphate. In accordance with the above, Government of India set up a fertilizer factory at Sindri to manufacture ammonium sulphate and the factory went into production in November, 1951. However, with the development of future plans for increased fertilizer production in the country, technologists favoured production of nitrogen materials with a high nitrogen content such as urea, ammonium nitrate and high analysis complex fertilizers, containing both nitrogen and phosphorous. The relative cost of various forms of nitrogen fertilizers per lb of nitrogen delivered to the farmer has been worked out as follows:—

	Ammonium Sulphate	Ammonium Suplhate Nitrate	Calcium Ammonium Nitrate	Ammonium Nitrate	Urea
Relative cost to farmer	100	92	89	73	72

Evidently, the two most favoured materials are urea and ammonium nitrate. Ammonium Nitrate has a certain degree of explosion and fire hazard and our cultivators cannot be expected to handle this fertilizer. It is, therefore, ruled out at present. The other alternative was Calcium Amm. Nitrate. But this product contains free lime and has also not very desirable physical properties being some-what hygroscopic in nature. As it contains free lime its long term use on neutral and alkaline soils as in this State is also not considered safe from the view of permanent soil fertility. But, its production is scheduled at Nangal and Rourkela to cater for our dry areas or Punjab, Rajasthan and Madhya Pradesh.

In U.P. since the soil is mostly neutral and alkaline the production of Calcium Ammonium Nitrate is not considered very sound. The other material most suited is Urea. As our cultivators are long familier with Ammonium Sulphate, the production of Ammonium Sulphate-Nitrate is also full of high promise in view of its lower gypsum requirement, lower cost of production and higher nitrogen contents. Trials conducted on cultivators' fields in U. P. comparing Ammonium Sulphate, Ammonium Sulphate Nitrate and Urea have shown that the three fertilizer materials compare almost identically for wheat and paddy on same nitrogen level at doses usually given to these crops. On these considerations, there is scope to locate one unit for producing Ammonium Sulphate Nitrate and one unit for the manufacture of Urea.

It is proposed to establish the following units of nitrogenous fertilizers factories:—

(*i*) One unit of Ammonium Sulphate Nitrate Double Salt (26%

nitrogen) of the capacity of 70,000 tons nitrogen per year yielding approximately 270,000 tons of the mixed fertilizer. Approximate electrical power required is 30,100 KW and it will cost about Rs. 2,580 lacs.

(*ii*) *Ammonium Sulphate and Urea:*—It will be on Sindri Fertilizer model and its requirements will be approximately the same as given for Ammonium Sulphate Nitrate Double Salt. The capacity of this unit would be 70,000 tons of nitrogen per annum.

As an alternative to the above, about 70,000 tons Nitrogen is recommended to be made by setting up a compound fertilizer factory for the manufacture of Nitro-phosphate-cum-Calcium nitrate, with the ratio of 1 : 1 as N : P^2O^5. For a production of 2,12,000 tons Nitro Phosphate and 1,80,000 tons calcium nitrate, power required is 26,000 KW, and the total cost is estimated to be Rs. 2655 lakhs.

(*iii*) *Expansion of Sahu Chemicals:*—It is also proposed to expand the existing capacity of the Sahu Chemicals as follows:—

Ammonium Chloride	25,000 tons Nitrogen.
Urea	25,000 tons Nitrogen.

making a total of 50,000 tons of nitrogen. Thus by developing the existing facilities and by setting up two new factories, we will be able to achieve the production of about 2,00,000 tons of nitrogen.

PHOSPHATIC FERTILIZERS

According to D.O. No. 1 & M/4(5)4/59, dated 16th October, 1959 from Sri K. Vyasula, Planning Commission, New Delhi addressed to the Director of Industries, U.P., a target for the production of only 1,20,000 tons of P_2O_5 in the form of Single Super-phosphate. has been fixed for the Third Plan period. The total estimated requirement for P_2O_5 upto the end of the Third Plan period is estimated at 5 lac tons. Thus the remaining nearly 3.8 lac tons of P_2O_5 is proposed to be met by triple superphosphate or bonemeal.

As the percentage of P_2O_5 in single super phosphate is about 16, the total requirement of single super-phosphate for providing 1,20,000 tons of P_2O_5 would be 7.5 lacs tons. At the end of Third Plan the irrigated area in U.P. would be 16 million acres, as against a total of 80 million acres in the country. Thus the requirements of fertilizers in Uttar Pradesh would be nearly one-fifth of the total requirement in the country. So there is scope for the production of 1.5 lac tons of single-super phosphate in the State. Five applications for grant of licences for super phosphate have already been forwarded to the Ministry of Commerce and Industry, Government of India, out of which licence has been granted only to M/s. Rallis India Ltd. with an installed capacity of 60,000 tons per year. There is a scope for the sanction of 3 more licences for this State. One of the licences could be granted to M/s. D.C.M. Chemical Works who propose to put up their factory in Allahabad and the other may be granted to M/s. J. K. Spinning & Weaving Mills Ltd., who propose to put up plant at Kanpur and the third to M/s. Ratna Sugar Mills, Shahganj who propose to put up their factory at Shahganj.

So far as the supply of P_2O_5 from bone meal is concerned, out of the total bones which are crushed the production of bone meal is only about

25 to 30% while the remaining crushed bones are exported and are a source of foreign exchange. It needs consideration as to whether it would be advantageous to stop the export of crushed bones or to import rock phosphate from the foreign exchange earned by the export of crushed bones. Any way, the total quantity of P_2O_5 which could be made available from the bones is not expected to increase beyond 1 lac tons per year and, as such there are only two ways, either to produce triple super phosphate or to revise the targets fixed for the production of single super phosphate. In case it is ultimately decided that the target fixed for single super phosphate should be increased from 1,20,000 tons, then there would be scope for the establishment of two more Super Phosphate Factories in Uttar Pradesh.

Triple Super-phosphate (45% P_2O_5).

Besides the proposal for single super phosphate a scheme for one unit of Triple Super-Phosphate factory with a capacity of 1,20,000 tons per annum, costing about Rs. 1785 lakhs, has been prepared. As it will require 32,000 K. W. power, it is proposed to be set up in Moghalsarai or south of Mirzapur in Chopan or Kota areas. It will not require any imported sulphur for the production of sulphuric acid required for the manufacture of single super-phosphate. The phosphoric acid produced by electrical process will be utilised for the manufacture of Triple Super-phosphate or for Ammonium Phosphate Nitrate. However, in view of the accepted priority of other fertilizers, this scheme has been deferred for the IV Plan.

DICALCIUM PHOSPHATE

A very small unit of 3600 tons per annum for the manufacture of Dicalcium Phosphate has been proposed alongwith the manufacture of 6600 tons caustic soda. The site selected is Sardarnagar. The combined project of Caustic Soda and Dicalcium Phosphate will cost about Rs. 91 lakhs and power required will be 3270 K.W. The fertilizers will be utilised for acidic soils.

MIXED NITROGEN—PHOSPHATIC FERTILIZERS.

1. *Ammonium phosphate-Nitrate*:—A unit of 2,92,000 tons of mixed fertilizer containing 2,32,000 tons diammonium phosphate and 60,000 tons ammonium nitrate, will involve an expenditure of Rs. 3,340 lakhs and power required will be 69,000 KW. The site proposed is south of Mirzapur where cheap hydro-electric power in large quantity may be available. In view of the large power requirement this scheme should be deferred to the IV or V Plan period.

2. *Nitrophosphate* (2,12,000 *tons*) *and Calcium Nitrate* (1,80,000 *tons*):—The scheme is proposed to be worked out in Eastern U. P. The cost of the project is Rs. 2,655 lakhs and power requirements amount to 26,000 K.W. This compound fertilizer is to be produced by the reaction of nitric acid on rockphosphate and subsequent treatment with ammonia. This compound fertilizer contains 20% nitrogen and 20% available P_2O_5. This unit has been included in the III Plan—as an alternative to the unit for Urea.

LOCATION OF FERTILIZER FACTORIES.

The Fertilizer Production Committee have recommended in their report of the year 1956 on pages 50 to 53—"The end product which can be most conveniently established in the vicinity of Churk, on the basis of utilisation of hydro-electric power is nitro-limestone in view of the proximity of limestone deposits. Alternatively, sulphate-nitrate can be made along with urea, whether the factory is located at Mirzapur or near Churk, assuming the utilisation of coal brought from the Bihar coal fields and gypsum brought from Rajasthan. Utilisation of the newly discovered coal at Singhrauli, which has been suggested in the U. P. Memorandum does not appear to us to be immediately feasible if only for the reason that the deposits have still to be fully proved.

Of the three alternative locations, Mathura, Agra, Hathras, we have had to rule out the former two partly because they suffer from heavy congestion of railway traffic but mainly because all-the-year-round water supply is likely to present a very difficult problem. We understand that the minimum flow in the Jamuna in the driest month is nil near Agra/Mathura, further that underground starta conditions at either place are unfavourable. We have thus selected in the end, for further investigation Hathras which is, geologically, in the same area as Harduaganj near Aligarh which was the first preference of the Technical Mission appointed by Government in 1944 to make recommendations on among other things, the most suitable location of the first nitrogen fixation factory in India. In selecting Harduaganj the Technical Mission assumed, on the evidence furnished by U. P. Irrigation Engineers, that adequate supply of water can be secured for factory purposes by "a comparatively inexpensive system of tube-wells." The U. P. Government have confirmed our presumption that the same conclusion will hold good in respect of Hathras as well. We were told that some hydro-electric power may be available for a factory in this neighbourhood from the Ramganga project of which we understand the firm power yield will be of the order of 30,000 K.W. In discussion with the authorities of the C. W. P. C., however, we gathered that the Ramganga project is still under investigation and has yet to receive approval".

The sites proposed for location of nitrogenous Fertilizers Factories, are Agra, Hathras, Mathura and Sitapur in the Western and Central U. P. and Gorakhpur, Chopan or Shahganj in Eastern U. P. The unit in eastern U. P. could utilise furnace oil from Barauni instead of coal. Almost all these places are located on both metre and broad gauge railway lines and plenty of land is also available. It has been ascertained that 25 cusecs water (14 million gallons per day) is likely to be available from tube-wells. Detailed study regarding the most suitable locations is presently underway.

Regarding the location of triple super-phosphate or nitro phosphate factory the sites near Chopan or Obra in South of Mirzapur in Rihand area are preferred on account of availability of power, water, land and coal from Singhrauli fields. The new railway link connecting Churk-Pipri and Garhwa Road is being set up and Singhrauli coal field will become easily available. According to the latest report, 400 million tons of coal and 90 feet thick seams have been discovered at some places. Quality of coal has been graded as No. 1. Thus thermal power could be generated on the spot.

HEAVY CHEMICALS.

Sulphuric Acid.

The State will require contact Sulphuric Aid of 100 per cent concentration for the manufacture of Super-phosphate. Ample justification has been given for setting up four factories for the manufacture of Single Super-phosphate. Four Sulphuric acid plants for the Phosphate factories will be required. The capacity of each plant will be 100 tons per day of 100% concentration. This capacity is somewhat more than the requirements of the Super-phosphates and the surplus acid will be utilised for other Chemical Industries.

Nitric Acid.

Nitric acid will be required for the proposed units for Ammonium Sulphate-Nitrate and Nitrophosphate-cumCalcium Nitrate—the quantities of 100% nitric acid required being 260 tons/day and 370 tons/day, respectively. The nitric acid will be produced by ammonia oxidation. The cost and other details for the nitric acid units form part of the fertilizer units proposed.

Soda Ash.

The Scheme for the production of 100,000 tons per year of Soda Ash has been provided as an adjunct to the production of Urea and Ammonium Chloride Fertilizers at the Sahu Chemicals along with their existing plant. Soda Ash is in very great demand for the Glass, Soap, Silicate, Washing industries, etc. Salt required for the manufacture has to be procured from Rajputana.

Caustic Soda.

Caustic Soda is required for the manufacture of soap, paper, paper board, news-print, textiles, rayon staple fibre, aluminium, petroleum refining, chemicals, Vanaspati etc. It has been estimated that the existing factories in India will be falling short by about 36,000 tons of Caustic Soda by the end of 1960-61 in meeting the full requirements of the country. It is, therefore, recommended to set up three plants, each of 20 tons per day capacity. The chlorine and hydrogen produced in one of the above plants is proposed to be utilised for the manufacture of dicalcium phosphate. Proformas and nucleus reports on the subject will give full information about all the requirements.

Bleaching Powder.

The demand for chlorine and chlorine products like bleaching powder, bleaching liquor, and liquid chlorine was collectively estimated by Tariff Board at about 700 tons of chlorine per annum for textiles, sanitation and water purification and for bleaching of paper and pulp, by the end of the First Five Year Plan. The rated capacity of 3 bleaching powder producing factories at Tata Chemicals Ltd., Mettur Chemicals and Industrial Corporation, Mettur, Mettur Dam and Rohtas Industries Ltd. in the First Five Year Plan was estimated to be 7,800 tons. The Mettur Chemicals and Industrial Corporation, Mettur Dam completed their plant for the manufacture of stable bleaching powder in 1951 and their capacity is 6,000 tons.

The State needs one bleaching powder factory of the capacity of 10 tons per day. Ample limestone of very high quality is available in Dehradun and Bundelkhand regions. The location of the plant for the manufacture of caustic soda and bleaching powder is recommended to be at Sardarnagar or Bareilly or Saharanpur or Moghal Sarai. The new method for the manufacture of bleaching powder by continuous process instead of stationary brick-kilned horizontal chamber is recommended. The latest type of chamber is mechanically operated vertical tower. The product contains 25 to 30 per cent available chlorine. The available chlorine can be increased to 35—38 per cent by using good quality lime.

High Test Hypo-chlorite

Similarly, the setting up of one unit of High Test Hypo-chlorite is justified. This project has been postponed for the IV Plan when the bleaching powder unit will be fully on steam.

Calcium Carbide

Calcium Carbide is mainly used in the generation of acetylene gas, whose applications may be broadly classified into two categories:—

(*i*) Acetylene for welding.

(*ii*) Acetylene for the manufacture of numerous organic chemicals and products; some of the important ones are listed below:—

(*a*) Solvents: Poly-vinyl alcohol, Trichlorethylene.

(*b*) Plastics and Plasticizers: Poly-vinyl chloride, vinyl acetate, acrylic acid derivatives, glycol etc.

(*c*) Synthetic rubber of Neoprene type.

(*d*) Other chemicals: Acetic acid and its derivatives.

In the advanced countries like U.S.A. and U.K. nearly 80 to 90 per cent of the carbide production is utilised for the second purpose. In India it is used only for welding purposes in which field electric welding is its serious competitor, but for certain purposes electric welding cannot replace it.

At present the only factory manufacturing calcium carbide in India is located at Calcutta and has a production capaity of 3000 tons per annum. The balance of the requirement is being imported. The Planning Commission of India has granted licences for a production capacity of 25,000 tons per annum by the end of Second Five Year Plan on the basis that 30 per cent of the production would be utilised for the second purpose namely organic chemical industry.

The target for steel production for the Second Five Year Plan is nearly 5 million tons per annum of finished steel, which is four times of the pre-second plan period. With the trebling of steel production and emphasis on the rapid growth of organic chemical and plastic industry in the III Plan period, it is quite reasonable to assume that the requirement of calcium carbide will be two fold of second plan period. As U. P. has a sizeable heavy machinery industry, possesses extensive deposits of high grade lime-stone and is located near the coal fields, the demand for a 6000 tons per annum unit of calcium carbide can easily be pressed. The Planning Commission has recommended 5000 tons per annum as minimum unit for this project.

This project does not require very high investment like some other heavy chemicals. At the prevailing rates there is a turn-over of Rs. 9 lacs of profit for an investment of less than Rs. 40 lacs (28 lacs as capital expenditure on plant, machinery and building and 14 lacs recurring; net investment will be of the order of Rs. 30 lacs). But the prices are likely to go down due to competition and reduction of protective duty and hence a profit of Rs. 5 lacs has been estimated in the nucleus report.

The factories in Mirzapur and Dehradun regions, where full facilities of power and raw-materials are available have been recommended, the former in the public sector (vide Working Group on Cement Factory) and the latter in the private sector.

PROPOSALS FOR SETTING UP HEAVY CHEMICAL INDUSTRIES IN IV PLAN

The following items have been recommended for implementation in the IV Plan:—

(1) Nitrophosphate-cum-Calcium Nitrate (if Urea unit is taken up in III Plan).

(2) Phosphoric Acid and Triple Superphosphate.

(3) Ammonium Phosphate through Phosphoric Acid produced by electric furnace.

(4) Phosphorous.

(5) High Test Hypochlorite.

(6) Potassic Fertilizers.

(7) Cyanamide.

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TABLE 'A'

ESTIMATED CONSUMPTION AND PRODUCTION OF NITROGENOUS FERTILIZERS IN TERMS OF 'NITROGEN' IN DIFFERENT ZONES.

	(Consumption)			(Production)		
Zone	State	Nitrogen tons	Total Nitrogen tons	Centres of production	Quantity proposed tons	Total tons
1	2	3	4	5	6	7
I ..	Punjab	50,000		Nangal	80,000	
	Pepsu	12,000			10,000 Varanasi	
	Himachal Pradesh	2,000			90,000	
	Uttar Pradesh	44,000				
	Rajasthan (North-West)	2,000				
	Jammu and Kashmir	3,000				
	Delhi	500	1,13,500			90,000

1	2	3	4	5	6	7
II	Rajasthan except (North-West) ..	1,000				
	Ajmer	200				
	Madhya Bharat	6,000		Bhilai	10,000	
	Vindhya Pradesh	2,000				
	Madhya Pradesh	22,000				
	Bhopal	3,000				
	Saurashtra	2,000				
	Kutch	400				
	Bombay	21,000		Trombay	80,000	
	Hyderabad	18,000	75,600			90,000
III	Mysore	18,000				
	Coorg	500				
	Travancore-Cochin	12,000		Expansion of Fertilizers and Chemicals, Travancore, Ltd.	10,000	
	Madras	40,000		Nevyeli	70,000	

1	2	3	4	5	6	7
III (Contd.)	Andhra	34,000				
	Orissa	15,000		Rourkela	120,000	
	Bihar	34,000		Sindri	87,000 Original 47,000 Expansion	
	West Bengal	20,000				
	Assam	10,000				
	Tripura	200				
	Manipur	200	183,900			3,34,000
	Grand Total ..		373,000			5,14,000

6. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'FINE CHEMICALS AND PHARMACEUTICALS.'

Dr. B. Mukerji was selected chairman of the Working Group. First meeting of the Group was held on May 9, 1959 at Lucknow when a list of 14 projects, to be taken up by this Group, was drawn up. This was subsequently reduced to 10 items in the Conveners' meeting at Kanpur.

Second meeting of the Group was held on August 29, 1959 at Lucknow, when the following projects, as drawn up by the authors, were discussed in detail and priorities were assigned in consultation with other conveners at a meeting in Kanpur.

Projects for the III Plan	*Authors*
1. Antibiotics ..	Dr. B. Mukerji.
2. Phytochemicals ..	Dr. S. Rohatgi and Dr. M. L. Dhar.
3. Alcohol based Chemicals: ..	Dr. M. L. Dhar.
(*i*) Direct utilisation of Alcohol.	
(*ii*) Utilisation of Alcohol via Acetaldehyde.	
(*iii*) Utilisation of Alcohol via Ethylene.	
4. Insecticides and Weedicides	Dr. A.R. Kidwai.
5. Low Temperature Carbonisation of Coal.	Dr. A.R. Kidwai.
6. Synthetic Dyes	Dr. A.R. Kidwai.
7. Starch and Glucose	Dr. A.R. Kidwai.
8. Selected Inorganic Fine Chemicals	
Projects for the IV Plan.	
9. Other Inorganic Fine Chemicals ..	Dr. Satya Prakash and Dr. C. R. Mitra.
10. Chemicals based on Acetylene ..	Dr. A.R. Kidwai.
11. Chemicals derived from Cellulosic Wastes. ..	Dr. A.R. Kidwai.

Following is a brief account of the various project reports giving only broad features and justification for their being selected for the Development Plans of this State.

1. *Antibiotics:*—In this project, it is proposed to manufacture about 300 tons of important antibiotics such as Penicillin, Streptomycin, Tetracyclins, and other newer antibiotics. It is estimated that construction and equipment would cost Rs. 10 crores and this plant would produce antibiotics worth Rs. 25.76 crores at a production cost of Rs. 9.05 crores per annum. This industry is ideally suited for U. P., as the raw

materials and solvents required for the industry are mostly of agricultural origin such as milk sugar, glucose, starch, corn-steep liquor, oil and oil cakes, acetic acid, butyl alcohol and butyl acetate in addition to the inorganic acids, salts and alkalies which are already available in sufficient quantities. Moreover, the climate of northern U. P., with cold water and air of sufficiently low bacterial count and dust, very well suits the industry. It is suggested that the industry may be located at Rishikesh. It would not be out of place to emphasise the urgency of setting up the antibiotic plant at the earliest possible, as the present antibiotic production of the country is extremely low and, therefore, large quanties of antibiotics are being imported at a heavy cost. It is hoped that with the new plant at Rishikesh it would not only be possible to meet the increasing requirements of antibiotics in this country but it would also be possible, at a later stage, to export substantial quantities to the middle-east and the south-east Asian countries. In fact, it is conceivable that at a later stage of our agricultural and technical advancement it might be possible for us to export antibiotics to Europe and America at competitive rates because of the low costs of indigenous raw materials and labour. It may also be mentioned here that today in the advanced countries 75% of all the medicines used are antibiotic. Therefore, for improved medical facilities in this country it is essential that emphasis must be given to the greater production of antibiotics at the earliest possible.

2. *Phyto-Chemicals:*—The soil and climatic conditions of U. P. are ideally suited for the cultivation of a large variety of medicinal plants, in the planes, Tarai areas and the Himalayan hills at different heights. This State is already producing a large quantity of alcohol, acids and alkalies and has plans to produce other solvents from alcohol. Therefore, U. P. is in the most advantageous position to take up the production of Plant Drugs at a vast scale for internal use as well as for a large export trade. However, to achieve this object there must be systematic cultivation of the medicinal plants. This aspect has been taken up by the Group on Forest Products. In this Group we are concerned with only the manufacturing aspects for which it is proposed to have a plant at Rishikesh at a cost of Rs. 620 lacs. It is estimated that at this factory it would be possible to produce drugs worth Rs. 77 lacs with a foreign exchange saving of at least Rs. 100 lacs per annum.

This industry can be established in U. P. even without foreign technical assistance as the know-how is available in U.P. for establishing it and any new technical problem arising with this industry could be easily tackled by the Central Drug Research Institute and the National Botanical Gardens, both located in Lucknow. It may also be emphasised that this industry has a large indirect employment potential as the cultivation of medicinal plants would employ a large number of people, particularly in the Tarai and hill regions where the employment problem is quite acute and their economic development requires particular attention.

3. *Alcohol based chemicals:*—U. P. has a well established sugar industry which produces 60% of the sugar produced in the country. Therefore, utilisation of one of the by-products of this industry, molasses, leads to the development of a formidable alcohol industry. During 1958-59 total production of alcohol in India was 20 million gallons of which U. P. produced 12 million gallons and has an installed capacity of 17.7 million gallons which cannot be fully utilised unless chemical industries are developed for its full utilisation. During the III Plan with increased production the alcohol potential of this State might go up to 30 million gallons with an expected installed capacity of 27.5 million gallons per annum. Since there is not full utilisation of alcohol the

price of this commodity is extremely low and it is far cheaper than the world price of alcohol with considerable disadvantage to the distillers, sugar manufacturers and ultimately a great loss to the sugarcane cultivators. Therefore, in any development plans of this State industries based on the utilisation of alcohol must be given highest priority.

It is in view of this consideration that a Synthetic Rubber factory is to be set up at Bareilly and perhaps at a later stage it might be possible to have Polythene or other similar factories, which require huge quantities of alcohol and may be able to utilise the entire alcohol capacity of this State. However, economically and technically it would be more sound to have those alcohol based industries which produce basic organic chemicals and solvents required for the development of a chain of other chemicals, drugs, dyes, pharmaceuticals and insecticides industries leading ultimately to a higher rate of employment and producing more expensive goods to the material advantage of the manufacturers. labour and cultivators. Therefore, it is suggested that the manufacture of organic chemicals and solvents and other chemical industries must be given higher priority rather than the industries which consume large quantities of alcohol to produce cheaper goods.

For the production of chemicals from alcohol, it would be best to have 3 different units of sufficiently large capacities, each unit specialising in one category of chemicals. Scope of production of these units is given below:—

(i) *Direct utilisation of Alcohol* : to produce ether, chloroform, idoform, ethyl chloride, chloral, ethyl acetate, other ethyl esters, ethyl amines, ethyl mercaptans, ethyl fulminate etc. This unit may be located at Saharanpur, where chlorine would be available from the proposed caustic soda plant.

(ii) *Utilisation of alcohol via acetaldehyde* : to produce acetaldehyde, ethyl acetal, aldehyde-ammonia, aldol, pentaerythritol, acetic acid, acetic anhydride, crotonal-dehyde, crotonic acid and picolines etc. This project does not include production of butanol, acetone and diacetone alcohol as a project has already been drawn up dealing with these chemicals by the Fermentation Industries Group.

The factory for utilisation of alcohol via acetaldehyde may be located at Deoria.

(iii) *Utilisation of alcohol via ethylene*: to produce ethylene dichloride, ethylene dibromide, ethylene oxide, ethylene chlorohydrin, ethylene glycol, B—B-dichlorethylether, diethylene, glycol, cellosolve, ethanolamines, polyethylenes etc.

This project may be located at Unnao, where sulphuric and hydrochloric acids would be available from Kanpur.

It may be pointed out that there is already considerable demand of the above chemicals in the country and with the establishment of synthetic drugs, dyes and intermediates in the initial stages of the Third Plan, demand of the above chemicals would considerably increase.

Production capacities and economic aspects of the above 3 units are given in the proforma 'X'.

4. *Insecticides*: The greatest drawback to our country in all our

developmental efforts is the food deficit which has to be met through imports. It is estimated that by 1966 India would require 110 million mds. foodgrains to feed a population of 480 million and therefore our agricultural production must be raised by 8.2% per annum to make up the deficit by 1966. There is no reliable data regarding the damage done by the pests in the fields to the crops, but it is estimated that this loss would be around 12% (equivalent to Rs. 400 crores). Therefore, even if we cannot prevent all the damage, by the use of the modern insecticides, it should be possible to save at least 8.2% of the crops to make up the deficit.

Another factor which affects the yield of crops is the weed for the elimination of which a lot of effort and money are wasted by the farmers every year with little success and therefore for increasing agricultural output use of weedicides must be encouraged.

Since U.P. is an agricultural state, it requires large quantities of insecticides, pesticides, fungicides, and weedicides at very low price so that they are available to all the farmers in the desired quantities for increasing their agricultural production.

In India DDT, BHC and Nicotine Sulphate are being manufactured but their production is not adequate to meet the requirements of the country. Moreover, in the field of insecticides, we need a large variety of chemicals as every chemical has a specific insecticidal activity and cannot be used for all the varieties of pests, fungi and weeds. Therefore manufacture of the following insecticides, fungicides and weedicides has been suggested:—

1.	DDT and its related compounds such as DDD and Methoxychlor	.. 1,500 tons.
2.	BHC (Benzene Hexachloride)	.. 1,000 tons.
3.	Chlorinated Terpenes such as Toxaphene	500 tons.
4.	2, 4-D (2,4-Dichlorophenoxyacetic acid)	.. 200 tons.
5.	Nicotine Sulphate	.. 100 tons.
6.	Organophosphorous Compounds	.. 2,000 tons.
7.	Inorganic insecticides, arsenicals, copper, zinc and mercury compounds.	.. 200 tons.
	Total:	.. 5,500 tons.

DDT and its related compounds, BHC, Chlorinated terpenes, 2,4-D and Nicotine sulphate can be manufactured from the raw materials available in the country but the production of the most modern and powerful organophosphorous compounds would have to depend upon imported phosphorous until it is produced in this country from bone or rock phosphate. Similarly, import of mercury and arsenic will also be required for the manufacture of some inorganic insecticides which would involve recurring foreign exchange. However, it is considered to be worthwhile to manufacture these insecticides from imported phosphorous, mercury and arsenic and increase agricultural output rather than do without them or import the finished products at very high costs.

Capacities and economic data are given in the detailed proforma 'X'.

5. *Low Temperature Carbonisation of Coal:*—Requirements of an economic domestic fuel have posed a very serious problem before the

country since we cannot afford to use firewood by denuding the forests nor can we any longer afford to burn dung which is required as an organic manure for raising agricultural production. According to a report of the Institute of Applied Economic Research submitted to the Ministry of Commerce and Industry of the Government of India, if the entire quantity of dung is used as manure it would produce 9 million tons of foodgrains, which would be equivalent to the production of 12 Sindri factories every year. Therefore, the Institute has recommended that the most economic fuel for domestic purposes in the country is the domestic coal (soft coke) which should be used in the urban as well as rural areas.

At the present moment, soft coke is produced by merchant cokeries at the site of collieries through a very inefficient method of carbonisation in which an important fuel, coal gas, is completely lost and recovery of other by-products is also low. Therefore, it has been suggested that Low Temperature Carbonisation should be carried out by modern plants which should be located in various industrial towns throughout the country so that the coal gas produced could be utilised as domestic and industrial fuel in addition to the soft coke as its main product. It may be pointed out that the additional cost of transport of the raw coal will be more than compensated by the full utilisation of coal gas and better recovery of the byproducts. The Institute has suggested that to start with eight plants should be provided during the Third Plan and two of them have been assigned for U.P.

Though our Working Group is concerned with the Fine Chemicals and Pharmaceuticals mainly yet we have included the project on Low Temperature Carbonisation of coal in our Group not only because it would fulfil the fuel requirements of our industries but also due to the fact that we are even more interested in the byproducts of this project. The Tar obtained as a byproduct when subjected to fractional distillation yields the very valuable aromatic chemicals which are important raw materials for the Drugs, Dyes, Pharmaceuticals, Insecticides and Rubber industries and for the present we have to depend for their supplies from Bihar and West Bengal.

It is suggested that this plant should be located at Kanpur, which has very high fuel requirement, with a capacity of 1000 tons of coal per day (3.5 lac tons/year) at a cost of Rs. 2.5 crores, of which 75% will be required as foreign exchange.

The daily production of this plant has been estimated as follows:

Soft coke	750 tons.
Ammonium Sulphate	5 tons.
Light Oil	2,000 gallons.
Tar	30,000 gallons.
Coal Gas	3 million cubic feet.

Distillation of Tar would yield Benzene, Toluene, Xylene, Naphthalene, Pyridine, Picolines and Quinoline.

It is further suggested that at least two more plants should be provided during the Fourth Plan. One of these may be located at Firozabad, which has a very high fuel requirement for its glass industry and the other at Allahabad or Ghaziabad.

6. *Synthetic Dyes:*—According to the present estimates of the Development Wing of the Ministry of Commerce and Industry at the end

of the Third Plan there would be a gap in the production and demand of dyes to the extent of 9.5 million lbs.

90% of the chemicals required for the manufacture of dyes are inorganic chemicals, which are available in U.P. The remaining 10% constitute aliphatic chemicals like alcohol, acetone, acetic acid, acetic anhydride and glycerine, which are also available in U.P., and aromatic intermediates which will have to be obtained from the intermediates factory to be set up by the Government of India in co-operation with a German firm.

Therefore, in view of the availability of raw materials and demand for dyes by a sizeable textile industry of U.P., and other north Indian towns it would be most desirable to have a dyes factory at Moghalsarai with an initial capacity of 5 million lbs. at a cost of Rs. 3 crores. This capacity will ultimately be raised to 10 million lbs. during the Fourth Plan.

7. *Starch and Glucose:*—There is a considerable demand of starch by the textile industry and pharmaceutical industry and we also have certain cheap grains like Tapioca and Corn, which could be used for the production of starch. Production of Glucose may also be done in the same plant as there is already considerable demand of Glucose in U.P. and with the setting up of the antibiotic industry at Rishikesh demand for starch, glucose and one of the byproducts of this industry, Corn Steep liquor, would be increased very greatly. Therefore, during the Third Plan we must have a plant for the production of:

Starch	25,000 tons.
Glucose Powder	3,000 tons.
Glucose Liquid	5,000 tons.

Economic data for this project is given in the proforma for reference.

8. *Inorganic Fine Chemicals:*—Certain Inorganic Fine Chemicals can be produced in U.P. with great advantage from the point of view that certain raw materials are readily available, and others because they are vitally necessary for the existing industries, as raw materials. The following is the list of chemicals:—

(1) Phosphorous and its oxygen and halogen derivatives which are required by the Chemical, Drugs and Insecticides Industries. They could be produced from Bone and Rock Phosphates provided sufficient electric power is available.

(2) Potassium and its salts can easily be produced in large quantities from the Spent Wash Liquors of the distillaries and, perhaps, from the press mud of the sugar industry.

(3) Potassium ferrocyamide from leather cuttings and proteinous residues.

(4) Aluminium salts from Alumina or Aluminum metal available from the Aluminum industry.

(5) Titanium Oxide from the Titanium containing residues obtained from the Aluminum industry.

(6) Hydroflouric acid which is required in large quantities by the glass and aluminum industry.

(7) Purple casius, which is required as a pigment by the glass industry. This is prepared from gold chloride and stannous chloride.

(8) Carbon Black which will be required in large quantities by the Rubber Tire Industry.

(9) Carbon Disulphide which is required for Xanthate Rayon industry and for the production of Carbon-Tetrachloride.

(10) Copper salts, copper-cuttings obtained from the metal industry can very profitably be utilised for the production of important copper salts.

(11) Potassium Permanganate, which is required in large quantities as oxidising agent in industry as well as medicine.

(12) Hydrogen Peroxide:—In recent years demand for concentrated-Hydrogen Peroxide solutions has very much increased and therefore production of this chemical is very necessary.

However, in view of the more pressing requirements for the development of other chemical industries, production of Inorganic Chemicals may be delayed until the Fourth Plan except for a few items like Potassium Permanganate, Hydrogen Peroxide and Aluminium and Titanium salts.

9. *Chemicals derived from Cellulosic Wastes:*—In view of the availability of a large variety of cellulosic wastes in huge quantities in this State, such as straw, bagasse, corn cobs and wood chips, two types of industries could be started:

(*i*) Dry Distillation or Destructive Distillation of cellulosic wastes to produce acetone, methanol and acetic acid.

(*ii*) Dehydration of cellulosic materials to produce furfural and its derivatives.

Though this industry is of considerable importance to U.P. with its vast agricultural and forest cellulosic wastes yet developments in this direction may be postponed until the Fourth Plan in view of other more pressing industries.

10. *Chemicals derived from Acetylene:*—Because of the availability of coal, lime-stone and power in the Rihand area we have ideal conditions for Calcium Carbide industry for which a project has been drawn up by the Cement Factory Group. Calcium Carbide when treated with water gives acetylene, which in modern organic chemistry, is considered to be the most important source of organic chemicals and, today, in the industrially advanced countries acetylene forms the basis of a large number of chemicals required for the Plastics, Dyes, Drugs and other chemical industries. In fact, for some of the chemicals which are being produced from alcohol today it might be economically more sound and technically advantageous to use acetylene. For example, the following chemicals could be made from acetylene with definite advantage:—

1. Vinyl acetate.

2. Vinyl chloride.

3. Diethylamine.
4. Tetrachloroethane.
5. Hexachloroethane.
6. Tetrachloroethylene.
7. Acetaldehyde.
8. Acetic Acid.

However, in view of our emphasis on the alcohol based chemicals during the Third Plan and time required for the development of Calcium Carbide indusstry, production of chemicals from acetylene may be postponed for the Fourth Plan by which time requirements of chemical industry would also have considerably increased.

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Aligarh.

7. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'OILS AND SURFACE COATING'

India occupies a prominent position in the world with regard to the production of oilseeds, producing about 10% of the total world output, and being the third largest producer after China and U.S.A. The total Indian production of the five major oilseeds during the first two years of the 2nd Five Year Plan was as under:—

	1956-57	1957-58
Groundnut	4,200 (000 tons)	4,271 (000 tons)
Rape & Mustard	1,026 "	905 "
Sesamum	442 "	363 "
Linseed	384 "	271 "
Castor	124 "	97 "
Total	6,176 (000 tons)	5,907 (000 tons)

Besides the above major oilseeds, she also produces other oilseeds such as cottonseed, copra, *mahua* and several other minor oilseeeds. The oils obtained from oilseeds form not only important articles of food but also constitute essential raw materials for important industries such as soaps, paints and varnishes, printing inks, vanaspati, lubricants etc.

Uttar Pradesh is one of the leading states in respect of production of oilseeds, contributing about one sixth of the total Indian out-put and being third in production after Andhra Pradesh and Bombay State. Her production of the five major oilseeds in the first two years of the 2nd Five Year Plan was as under:—

	1956-57	1957-58
Rape and Mustard	603 (000 tons)	502 (000 tons.)
Groundnut	176 "	207 "
Linseed	111 "	80 "
Sesamum	77 "	61 "
Castor	1 "	1 "
Total:	968 (000 tons.)	851 (000 tons.)

It is natural, therefore, that the oilseed crushing industry and industries based on oils and fats as raw materials form a major group of industries in the State, coming next only to the Textile and Sugar Industries. The oilseeds crushing industry which has grown up during the last three decades or so is fairly well developed, and there are at present well over one hundred big and medium sized oil mills registered under the Factories Act and a large number (about 1000) of small oil mills. Solvent Extraction units for recovering oil from oil cakes have also been installed in the State recently. Industries based on oils and fats have, however, not made much headway in the State so far. There are about one dozen big and medium sized soap factories and a large number of small soap making units scattered all over the State and about one dozen of big and medium sized paint and varnish factories. It is surprising that there is not a single printing ink factory in the State. As regards the Vanaspati or Oil Hydrogenation industry, the position is better, there being four big and well organised factories. The Cosmetics industry, consisting of articles of daily utility such as hair oils, snows and creams, shampoos, tooth pastes, shaving soaps and creams etc. which utilise oils and fats as raw materials has also not made much headway. This industry, however, may be treated under the category of small scale industries.

The oilseed crushing industry of the State has received a severe setback since the close of the last world war due to various difficulties, some of which arise out of the scarcity of essential requirements such as coal, power, iron and steel, tin plate, transport facilities etc. and others are due to Government policy in respect of such matters as levy of sales tax on oilseeds and oils, excise duty on production of oils and rules under the labour laws. The result is that the number of registered oil mills in the State which at one time had gone upto 200 has now dwindled down to about 100 only. Even now the situation is not satisfactory and the closure of oil mills continues. There have been, from time to time, representations from the industry with regard to these difficulties, but it has not been possible so far to do much towards their amelioration. But, apart from what the Government can do in order to rehabilitate the industry, a change is necessary in the trend of the industry which should adapt itself to the changed circumstances arising out of the post-war conditions. So far crushing of mustard seed and export of mustard oil to various consuming markets (such as Bengal, Bihar, Assam etc.) of the country had been the main feature of the industry. But now that markets of mustard oil have shrunk and the various consuming States are trying to develop their own oilseed crushing industry, it is necessary for the oilseed crushing industry of Uttar Pradesh not to depend any longer on mustard seed crushing alone but to divert its attention to crushing of other oilseeds such as groundnut, linseed, *mahua*, *neem*, cottonseed and other minor oilseeds. For this purpose necessary steps should also be taken to augment the production of these oilseeds in the State. As regards the new process of Solvent Extraction of oils, two plants have already been installed, one at Kanpur and the other at Aligarh. There is scope for installation of some more plants. It may be stated, however, that solvent extraction units require large quantities of oil cakes to feed them and depend largely on the extraction of groundnut cake which after being deoiled finds a ready market in foreign countries, whereas U.P. does not produce groundnut in such large quantities. At present she produces only about 2 lac tons of groundnut annually. It is necessary, therefore, for solvent extraction units to look to other oil cakes also, such as *mahua*, castor and cottonseed for extraction.

Industries based on oils and fats such as soaps, paints and varnishes, printing inks, vanaspati, etc. are more important as manufacturing industries than the oilseed crushing industry which depends to a large extent on the purchase and sale transactions and in which the manufacturing cost forms but a very small fraction of the total cost of the final product and the element of speculation is large. Manufacturing industries based on oils and fats on the other hand involve greater degree of manufacturing technique and higher working costs and are not so much affected by fluctuations in the cost of the raw materials and by speculative tendencies. It is, therefore, desirable that such industries are given greater fillip in the State. Other industries such as manufacture of synthetic detergents and surfactants and synthetic resins which have been developed in other countries should also be taken up in the

State. These developments will also help the oilseed crushing industry by utilising non-edible oils, as this industry which so far depended mainly on the manufacture and export of mustard oil should now divert its attention to producing other oils including non-edible oils.

There is a great shortage of oils and fats in the country, *per capita* per day production being about ½ oz. only whereas for edible purposes alone 2 oz. per head per day is the minimum requirement from nutritional standards. Therefore, every effort should be made to find new resources of oils and fats and produce more oils and fats in the country. For this purpose utilisation of rice bran for production of rice bran oil and collection of animal fat from slaughter houses for production of tallow from it are useful projects which can be developed in the State.

Two meetings of the Working Group were held, one on 30th April, 1959 and the other on 20th July, 1959 with Sri Hriday Narain in the Chair.

The line of thought of the Group was that the oils, fats and allied industries form a major group of industries in the State and their development on the right lines was very important in the economical and industrial advancement of the State. It was further thought that such projects should be undertaken which require higher manufacturing technique and which items are hitherto either not produced in the State or are not produced in sufficient quantities and for which suitable working facilities and raw materials are available in the State. It was also felt that due importance should be given to encourage the manufacture of such products as have made significant head-way in other advanced countries such as the fatty chemicals, surface active agents and synthetic detergents, synthetic resins etc. and if necessary collaboration with foreign firms may be sought for their success.

With the above line of though in view, the Working Group in its first meeting recommended the following projects for the master plan of the State with regard to the relevant group of industries.

1. Manufacture of fatty acids, fatty chemicals and synthetic detergents.
2. Manufacture of printing inks.
3. Manufacture of synthetic resins.
4. Solvent Extraction of oil cakes.
5. Rendering of Animal fats.
6. Cottonseed crushing.
7. Extraction of rice-bran oil.
8. Manufacture of Nitrocellulose.
9. Titanium oxide from waste liquors of aluminium manufacture.

The above projects and nucleus reports on the same were reconsidered in the 2nd meeting of the Group. In this meeting cottonseed crushing was deferred for subsequent plans as there was idle capacity available in existing oil mills for the III Plan period. The production of Titanium oxide from waste liquor of aluminium manufacture was also deferred as it was thought that the details and economics of the process are still to be worked out which could be done only after the aluminium factory has started working and the waste liquors are available for investigation. In the end the following projects were recommended for being implemented in the Third Five Year Plan period.

1. Manufacture of fatty acids, fatty chemicals and synthetic detergents.
2. Manufacture of printing inks.
3. Manufacture of Synthetic resins.
4. Extraction of Rice Bran oil.
5. Production of animal fat (Tallow) from slaughter house waste.
6. Solvent extraction of oil.
7. Manufacture of Nitro-cellulose.

Subsequently the project on manufacture of Nitro-cellulose had to be deferred on receipt of information from the Defence Department of the Government of India to the effect that a project to augment the present capacity of the Cordite Factory at Aruvankadu and to manufacture Nitro-cellulose of the required quality for the lacquer industry in sufficient quantities to meet the total requirements of the country had already been sanctioned and that there was no further scope in the III Five Year Plan to undertake a project for manufacture of Nitro-cellulose. A fresh project for 'manufacture of paints, varnishes and pigments' was, however, added in view of the fact that the production of these commodities in the State needed further development.

Nucleus reports in respect of the following seven projects were accordingly prepared:

1. Manufacture of fatty acids, fatty chemicals and synthetic detergents.
2. Manufacture of printing inks.
3. Manufacture of Synthetic resins.
4. Extraction of Rice Bran Oil.
5. Production of animal fat (Tallow) from slaughter house waste.
6. Solvent extraction of oils.
7. Manufacture of Paints, Varnishes and Pigments.

OM PRAKSH,
Oil expert to Govt., U. P.

8. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'FOOD AND ALLIED INDUSTRIES.'

The first meeting of the Working Group was held in the office of the Fruit Industries Development Officer, Lucknow on 14th May, 1959. Dr. Girdhari Lal was unanimously elected to act as Chairman of the Working Group. The second meeting of the Working Group was held in the office of the Director of Fruit Utilisation at Ranikhet on 29th June, 1959.

(*i*) *Fruit and vegetable processing*:—In the Programmes of Industrial Development, 1956-61, the Planning Commission, Government of India in regard to Fruit and Vegetable Preservation, have said, "The canning of fruits and vegetables is an industry which in India is still in its infancy. Compared to certain other countries like the United Kingdom, the U. S. A., Canada and Australia its size and output are very small. Thus as against a production of about 6 million tons in the U.S.A., over 400,000 tons in the United Kingdom, 300,000 tons in Canada and 160,000 tons in Australia, the average annual output of canned fruits and vegetables in India is only of the order of 2000-3000 tons and of fruit and vegetable products of all kinds only 20,000 tons. While a variety of fruits and vegetables are grown in the country which provides good scope for the development of the industry, inadequate domestic demand and general prejudice within the country against canned products have retarded its growth, and for a variety of reasons it has not been possible to develop any large export market.

The industry is a natural and logical corollary of the development of horticulture. Its importance in this country lies in the fact that it could prove a useful means of strengthening the agricultural economy and furthering rural industrialisation. Since it admits of being organised on a decentralised basis, it has considerable potentialities for providing employment in the rual and semi-urban areas. Given proper encouragement and assistance, it should also be possible to develop a large export market for its products.

The export of fruit and vegetable products from India has so far been much below what it should be. The average export of canned fruits and vegetable is about 1,000 tons per annum compared to 64,000 tons by Australia, 55,000 tons by the U.S.A., 30,000 tons by the Philippines, 19,000 tons by South Africa and about 14,000 tons by Malaya in 1952. Some fruit products, which are specialities of Indian manufacturers, like mango chutney, canned mangoes, guavas and papayas are in demand in foreign markets".

The *per capita* consumption in India of preserved fruit and vegetable products is 2 ounces per annum as compared to 86 lbs. in U.S.A., 57 lbs. in Canada and 20 lbs. in U.K. and Australia. The panel set up by the Ministry of Food and Agriculture has suggested that *per capita* consumption should be increased from 2 ounces to 8 ounces.

Fruit and vegetables are available in abundance only for a few months in a year, while during the rest of the year, they are beyond the means of the common man. During the glut season 30 to 40 per cent of the produce is wasted on account of either uneconomic prices or transport difficulties. The fruit preservation industry is gradually developing on account of the Central and the State assistance through subsidy on cans, concession on railway freight, community canning centres and the peripatetic units for popularising the use of fruit products. The annual production of fruit products has gone up in Uttar Pradesh from Rs. 16.8 lacs in 1954 to about Rs. 50 lacs in 1958.

In view of the potentiality of considerable expansion of fruit and vegetable processing industry in Uttar Pradesh, it was decided to prepare schemes for (*a*) setting up a unit at the Tarai State Farm for preparation of fruited cereals, strained baby foods, fruit toffees, mango slabs etc; (*b*) setting up 20 pulping units through-out the State for utilisation of mango, guava and other fruits through the Co-operative Processing Societies; (*c*) setting up a Dehydration Unit in the vegetable growing area with 1 ton per day capacity for handling peas, onions, cauliflower and carrot etc; and (d) setting up a Co-operative Processing Unit for manufacture of papain and pectin. Dr. Girdharilal has prepared schemes on the above projects.

(ii) Dairy products i.e. creamery etc.:—Since milk is produced in large quantities in Uttar Pradesh, and as fish is also available in fairly abundant quantities particularly in the eastern districts of the State, Sri N. K. Bhargava was requested to prepare schemes for manufacture of milk and fish products.

Sri Bhargava, however, reported that 7 Co-operative Milk Supply Unions have been organised for transport of milk from the rural areas to the towns during the Second Five Year Plan. In the Third Five Year Plan, it is proposed to increase the number of such units to 26 and also establish one milk powder factory and two casein factories at a total estimated cost of about Rs. 10.5 crores. In addition to the above, M/s. Glaxo Laboratories of India, Private Limited, are starting a baby food factory at Aligarh and M/s. Lever Brothers Limited are establishing a skim milk powder factory at Etah.

No concrete scheme has so far been prepared, but it is understood that schemes for establishment of Creamery, Milk Powder, Cheese and Lactose factories are under preparation by the Dairy Development Officer.

(iii) Supplementary food i.e. Glucose, Proteins etc.:—The average Indian diet is deficient in protein, as a large population is vegetarian. It was, therefore, considered desirable to prepare schemes for manufacture of proteinous foods from oil seed cake etc.

(iv) Processed food i.e. Cornflakes, Biscuits etc.:—Since there is a fair demand for cereal breakfast foods, like cornflakes, wheat flakes etc., and as import of such foods has been totally stopped, it was suggested that Sri S. C. Roy, Chief Scientific Officer may prepare schemes for production of such breakfast foods, biscuits and confectionery.

Sri S. C. Roy had prepared a preliminary report on biscuit industry in Uttar Pradesh, from which it appeared that only 30 per cent of the installed capacity of the organised biscuit factories in U.P. is being utilised owing to various difficulties particularly in obtaining essential raw-material like flour etc. at economic price.

Subsequently a meeting of the biscuit and confectionery manufacturers was called by the Additional Director of Industries, Kanpur, from which it was revealed that the Industry had problems of non-availability of suitably qualified personnel and anti-oxidents besides flour etc. at economic price.

As a result of discussion, it was felt that there is no scope nor necessity for establishing a new unit for manufacturing biscuits in Uttar

Pradesh in the Third Five Year Plan. It was, however, felt that in order to utilise in full the existing installed capacity, assistance should be given to the existing units.

It has not been possible to include a scheme for manufacture of corn flakes during Third Five Year Plan period.

Besides these four different kinds of processed foods, Dr. Surendra Rohatgi suggested possibility of manufacturing Glucose from molasses. Dr. Girdhari Lal explained that the strong flavour in molasses cannot be overcome and so the proposal was dropped. Sri Daya Nand suggested the necessity of having a project for manufacture of good quality bottles, as the same are not available and the fruit preservers have to depend on Alembic Glass Works, Baroda. The proposal was passed on to the Ceramics Group. It was also proposed that a project should be prepared for manufacture of cans and closures. This was generally agreed and the proposal was passed on to the small scale sector, as it was learnt that parties have evinced interest in putting up small scale units for the purpose.

Besides the schemes which have been finalised under fruit and vegetable processing, schemes on processing of subsidiary foods have also been submitted to Government on the basis of advice received from Government of India in the Ministry of Food and Agriculture. Government of India have allotted Rs. 10 crores in their Third Five Year Plan for starting manufacture of macaroni products, tapioca high protein foods (the multipurpose foods) and establishing a Subsidiary Food Division in every State. Schemes have, therefore, been conseqnently included on the lines advised by Government of India. Detailed information about these schemes is awaited from the Director, Central Food Technological Research Institute, Mysore.

Accordingly the following schemes were included in the proposals for the Third Five Year Plan, which were discussed by the Heavy Industries Plan Committee in their meeting at Kanpur on 29-9-1959:—

(1) Manufacture of fruited cereals, strained baby foods, fruited toffees and fruit slabs.

(2) Dehydration Unit.

(3) Pulping Unit.

(4) Papain and Pectin Units.

(5) Macaroni products.

(6) High protein foods (the multipurpose food).

(7) Organisation for better utilisation of food stuff.

These schemes were prepared by the Working Group on the assumption that not more than Rs. 70 lacs will be available for Food and allied Industries in the Third Five Year Plan.

The schemes were approved by the Heavy Industries Plan Committee, but the Committee desired that in view of the scope for considerable development of these industries both in private and public sector, schemes to the tune of Rs. 5 crores should be prepared.

Accordingly a meeting of leading fruit preservers which included Sri K. P. Bhargava, Proprietor, G. G. Industries, Agra, Sri Dharam Datt Vaidya, M.L.A., Prop. Chemicals and Fruit Products, U. P., Bareilly, Sri

S R. Tandon, Prop. S. R. Cannery, Allahabad, etc. was held at Lucknow on 15-10-1959. In consultation with these private manufacturers, the following new schemes have been included:—

(1) Four—Bottling Units for fruit beverages.

(2) Five—Canning Units.

(3) Four—Fish canning units.

(4) 16 —Cold Storage units.

Besides these new schemes, the number of units of the schemes originally proposed by the Working Group has been multiplied.

The Group decide that the following items should be deferred for the subsequent plans:—

(*i*) Quick—freezing units.

(*ii*) Freeze-drying units for fruits, vegetables, fish etc.

(*iii*) Cider manufacture.

(*iv*) Soyabeen products.

(*v*) Break fast foods—Cornflakes etc.

(*vi*) Biscuits and confectionery.

Dr. D. N. SRIVASTAVA,
Director,
Fruit Utilisation, U. P.,
Ranikhet.

9. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'ELECTRICAL ENGINEERING'.

Prior to the second world war, the demand of industries for electrical machinery and equipment was almost entirely met from imports. The outbreak of the second world war gave an impetus to various industries in the country and the demand for electrical goods suddenly increased. Due to the vast requirement of electrical goods as also due to shipping difficulties the exporting countries were unable to meet demands of foreign markets. As a result, during the second world war period, beginning was made for the manufacture of electric motors, transformers and certain other basic electrical appliances required for the industry.

With the advent of freedom a further impetus was given to the establishment of basic industries and as a result several organised units manufacturing transformers, motors, electric wires and cables, switchgear, electric fans and other electrical equipments have come into existence. The Working Group for Electrical Engineering Industries in their recommendations for industries to be considered for implementation during the Third Plan period have, therefore, reviewed the potential of the existing industries *vis-a-vis* the present and future requirements in order to eliminate implementation of such industries as have already been established in the country.

Electrical Engineering Industries—Scope Coverage.

The Working Group during the course of its meetings gave consideration to the following industries which have been arranged groupwise:—

GROUP A: HEAVY ELECTRICALS

(*i*) Manufacture of transformrs upto 33 kV.
(*ii*) Motors, A.C.
(*iii*) Switchgear upto 11 kV.
(*iv*) Electric wires and cables.
(*v*) Measuring instruments.
(*vi*) High tension insulators and bushings.
(*vii*) Traction equipment.

GROUP B: DOMESTIC APPLIANCES

(*i*) Refrigerators.
(*ii*) Air-conditioners.
(*iii*) Ceiling and table fans
(*iv*) Heating and cooking appliances.

GROUP C: ELECTRONICS

(*i*) Electronic instruments and components.
(*ii*) Radio components and assembly.

GROUP A: HEAVY ELECTRICALS

(*i*) *Transformers*:—There are nine organised units estsablished in different parts of India, including one in Uttar Pradesh, engaged in the manufacture of transformers upto a voltage of 33 kV. and sizes upto 6,000 kVA. During the year 1958 the aggregate capacity manufactured by the indigenous producers was 12,58,800 kVA. According to the estimates the production during the current year will exceed 13,10,000 kVA. In addition to these units, Heavy Electricals Factory at Bhopal which is expected to commence production in 1961 will be producing transformers of sizes 10,000 kVA. and above for 66 kV., 132 kV. and 220 kV. By 1964 the estimated production of these transformers by the Heavy Electricals Factory will be 6,85,960 kVA. The Working Group feels that the units already established in the country for the manufacture of transformers are capable of further expansion without heavy capital investment and these units together with Bhopal Heavy Electrical Factory will be able to meet the demands of the country for distribution and transmission transformers during the III Plan. The Working Group have, therefore, in their recommendations not included setting up of a factory for the manufacture of transformers during the III Plan, although this is an important item of electrical industry for subsequent plans.

(*ii*) *Motors, A. C.*:—There are already six organised units manufacturing motors upto 200 BHP and suitable for operation on 3 phase, 400 volts. The Indian manufacturers who have already established have plans to take up manufacture of motors for 2200 volts of size upto 1000 BHP. In addition, the Heavy Electricals Factory at Bhopal will take up the manufacture of larger sizes of motors suitable for operation on 3300 volts and higher voltages. During the year 1958, 6,15,000 motors were manufactured by the units already established. The Working Group is of the opinion that the capacity of the units already established is adequate to meet largely the present requirements of the industry and it will not be desirable to set up a factory for the manufacture of electrical motors, during the III Plan. This item has also therefore, been deferred for subsequent plans.

(*iii*) *Switchgear upto* 11 *kV.*:—The Working Group considered only switchgear upto 11 kV. for the reason that Switchgear for higher voltages will be manufactured by the Heavy Electricals Factory at Bhopal. The programmes of the various factories which have undertaken manufacture of switchgear are not fully known but five of the manufacturers have taken up production of switchgear upto 11 kV. and 150 mVA. All high voltage switchgears have to be made to suit various supply voltages and the requirement of each type is not adequate to take up mass manufacture. In the medium and lower voltage groups of switchgear, in addition to five organised units a number of smaller units have taken up the manufacture. It is hoped that within the next five years the country's requirements of lower and medium voltage switchgear will largely be met by the units already established. The Working Group, therefore, did not feel justified in recommending the manufacture of switchgear in the State during the III Plan.

(*iv*) *Electric wires and cables*:—India's present annual requirement of paper insulated underground cable is of the order of 2,000 miles and of other types of insulated cable 150 million yards. Our present production capacity can meet only one quarter of our requirement of paper insulated under-ground cables and nearly 40% of other types of cables have to be imported. With the rapid increase in the industrialisation, the need for electric cables will be considerably more in the future years. Self-sufficiency in the manufacture of all types of insulated electric cables is therefore, of the prime importance in order to eliminate India's dependence on import of this essential item.

The properties of aluminium as an electric conductor are well known and with the recent scientific advances in the production of aluminium of highest purity, aluminium is rapidly replacing copper as an electric conductor. India's resources of aluminium ore are vast. With the establishment of aluminium factory in Mirzapur district with an estimated production of 20,000 tons per annum ingots of high purity aluminium suitable for drawing of aluminium conductor will become available in the State.

The Working Group, therefore, felt that establishment of an electric wire and cable factory in Uttar Pradesh during the III Plan will go to bridge the gap between the demand and supply of this indispensable item and have suggested aluminium conductor instead of copper owing to country's resources of copper, lead, antimony zinc and nickel being scarce. A preliminary report on the establishment of an aluminium electric cable factory in the neighbourhood of Mirzapur with a capacity of 500 million yards of paper insulated cable and 50 lacs yards of other sizes of insulated cable has been prepared by the Working Group.

(*v*) *Measuring Instruments*:—With the rapid industrialisation and electrification, the requirements and the manufacture of electrical instruments have increased and there is no fully equipped manufacturing organisation for the manufacture of electrical instruments.

It is very difficult to give import figures for measuring instruments as large amount of electrical instruments are imported with electrical machinery and equipment, but taking conservative figures for 1957-58 the figure would not be less than Rs. 5 crores.

If, therefore, a modern manufacturing organisation is set up in the State during the III Plan, a large amount of foreign exchange would be saved.

Electrical instruments have a vast and varied field and the Working Group feels that in the initial stages manufacture should be confined to a limited number of measuring instruments of commercial quality. The Nucleus Report on Electrical Measuring Instruments envisages manufacture of the following types of instruments:

1. Voltmeter.
2. Ammeters.
3. Power factor meters.
4. Frequency meters.
5. Wattmeters.
6. Synchroscopes.
7. Leakage Indicators.
8. Battery meters.

PORTABLE INSTRUMENTS

1. Voltmeters.
2. Ammeters.
3. Combined Voltmeters and Ammeters.
4. Earth Continuity Testers.

5. Meggers.
6. Link Testing Ammeters.
7. Phase Rotation Indicators.
8. Voltage Transformers upto 66 kV.
9. Current Transformers upto 66 kV.

(*vi*) *High Tension insulators and bushings*:—The manufacture of high tension insulators has been included in the scope of the Ceramics Group. But as this is an extremely important item for electrical industry, the Working Group suggests that apart from the manufacture of high tension insulators upto 220 kV the manufacture of high tension bushings upto 33 kV should also be included subsequently in the scope of this factory. At present the bushings for the transformers manufactured in the country have to be imported and inclusion of this item in the scope of high tension insulator factory will fill the gap and reduce the burden of imports.

(*vii*) *Traction equipment*:—The three important items of traction equipment are (i) motors operating on high voltages, (ii) switchgear, and (iii) rectifiers. All these 3 items are programmed for manufacture by the Heavy Electricals Factory at Bhopal. These items are of a highly specialised nature and their demand for the present is very limited. The Working Group, therefore, feels that the manufacture of these specialised equipments should be left to the subsequent plan periods.

GROUP B: DOMESTIC APPLIANCES.

Except in the manufacture of ceilling and table fans, the production capacity of the established units is far below the consumers' requirement of important items such as refrigerators, airconditioners and heating and cooking appliances, and therefore a vast scope for the manufacture of high quality consumers' appliances exists. These items however have either been included in other Groups or have to be taken up as small scale industries to start with. The Working Group has therefore not examined in detail the proposals for setting up a large-scale factory for various consumers' appliances during the III Five Year Plan.

GROUP C: ELECTRONICS.

In all the technically advanced countries electronics occupies a prominent place whether it be home or industry. Application of electronics for radio and television is well known and the contribution it is making to the civic life of a community cannot be over-estimated. In the industry it has wide and varied uses. For instance it is electronics which comes to the aid of power engineer in controlling power systems; control of generating stations situated in inaccessible places; telecommunication at high voltage lines; determination of stability of power systems; its application to generation of electricity with nucleur energy; vast and varied application for the defence of a country; automation of the industries; compilation of accounts and statistics.

The Working Group feels that progress in the industrialisation of a country cannot be achieved without self-sufficiency in the field of electronics. India has made a beginning by establishing a factory known as the Hindustan Electronics at Bangalore which will be manufacturing certain types of appliances and equipments required for electronics. Some other units have also taken up assembly of radio receiver sets, but these units which have been established will be totally inadequate to meet the growing demands of the country in this field. There is therefore, an urgent need to establish additional units to take up manufacture of electronic instruments and components for a wide variety of uses not yet covered by the units already established.

The electronics industries require a vast variety of raw materials and the question of setting up this industry in the proximity of raw materials therefore does not arise as all these materials can never be found at one place. The important thing in regard to electronics industry is highly skilled and technically qualified personnel and collaboration with a well known foreign firm such as Marconi or the Radio Corporation of America for the 'know-how'. Uttar Pradesh has a chain of technical institutes and several universities imparting higher technical knowledge in electronics.

With the establishment of the Indian Institute of Technology at Kanpur the resources of the State in technical personnel will further be supplemented. The Working Group has, therefore, recommended setting up of the following three factories in the Electronics group in Kanpur—Lucknow zone during the Third Five Year Plan period:—

(*i*) Electronic components industry;

(*ii*) Electric Instruments industry;

(*iii*) Electronics equipment industry.

Transistors.

The scope of the electronic components industry will be to produce components and parts of Capacitors, Resisters and Inductors. At this stage, special mention should be made of Transistors which are fast replacing thermionic valves. At present there is no organised industry which is manufacturing this component and according to the information M/s. Bharat Electronics have no plans to manufacture transistors at present. Therefore, if the manufacture of transistors is taken up by this proposed Electronic Components Industry, it will be filling a big gap in the requirements of the country. The present import of transistors can in no way be useful as a guide, as the numbers are always negligible. However, a rough estimate of the anticipated consumption in the country shows that about 10 lacs of transistors can be consumed annually. The consumption is likely to increase with the development of rural receivers working from the transistors. The Working Group has strongly recommended taking up manufacture of transistors as a major item in the industry. A nucleus report on the industry covering the various aspects such as materials required, power requirements, details of the machinery and plant, the fixed capital as well as the running capital has been prepared by the Working Group.

The electronic instruments industry will manufacture components required mainly by the industry and research worker. In the beginning this industry will take up the manufacture of common measuring instruments, but subsequently during the IV and V Plan periods it could take up production of complex and delicate apparatus for radio and television, transmitting appliances and equipment. In due course, this factory can be developed into a national electronics centre.

Electronics Equipment Industry.

The Electronics Equipment Industry will undertake manufacture of a complete range of components required in the field of Electronics and will undertake to assemble broadcasting transmittors and receivers, field transmittor-cum-receivers, tape recording equipment, dictaphones, public speaking equipment, oscillographs, electromedical appliances and electronic statistical and accounting machines. Due to the highly specialised nature of the components used in electronics field, the technical collaboration of one of the leading manufacturing firms will be necessary. It may also be necessary to employ foreign experts for some years until Indian personnel for technical work has been trained to take over the duties.

Summarising, the Group has recommended taking up the following large scale industries in the electrical engineering group during the Third Five Year Plan:—

1. Aluminium Electric Cable Industry.
2. Electrical Measuring instruments.
3. Electric Instruments and Equipment Industry.
4. Electronic Components Industry.
5. Electronics Equipment Industry.

N. N. KUNZRU,
P. A. (Technical) to
General Manager,
KESA, Kanpur.

10. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'MECHANICAL ENGINEERING'

General:—It was during the second world war that some beginnings were made in the manufacture of industrial machinery in India due to difficulties faced at that time in procuring capital goods. Subsequently, in the post-war period, the industrialists formulated plans on more substantial scale in collaboration with the reputed foreign firms for developing production of several items on an organised basis.

The progress was made in the First Plan in the investigations as well as diversification of production of items of machinery. It is estimated that the output of the capital goods and industrial machinery was about Rs. 20 to 25 crores in 1955 as against about Rs. 3 to 4 crores at the commencement of the First Plan. The Working Group for Mechanical Engineering Industries considered a number of basic industries for implementation keeping in view the achievements of the schemes launched in the First and Second Plans, difficulties experienced *vis-a-vis* industrial development in general. It was further considered plausible to associate progressive industrialists, experts and experienced officers in the formulation, examination and finalisation of various schemes and projects recommended for inclusion in the next Five Year Plan. The Working Group during the course of its meeting gave consideration to a number of projects which are summarised hereinafter. These reports are arranged in order of priority taking into consideration the need and the scope of the projects, their costs, foreign exchange involved and estimated contribution towards development of industries in the heavy industries sector in the State.

(1) *Manufacture of machine tools:*—Machine tools are the basis of all the modern industrial production. This is the most vital engineering industry in the industrial setup of the country in as much as it produces basic machines required for industrial production.

The demand for machine tools in future years is expected to record a sizeable increase in consequence of the general industrial bias of the Second Five Year Plan and particularly due to development programmes envisaged in the field of (*a*) manufacture of industrial machinery, railway rolling stocks, ship building and auto-mobile industry and (*b*) the expansion in the manufacture of other heavy and light industries such as electric transformers, diesel engines, agricultural implements etc., which would create considerable demand for special and general purpose machine tools. The overall demand for machine tools is expected to increase by about 40 per cent per annum. The Industry has, therefore, got excellent prospects for development.

The Indian machine tool industry may be broadly grouped into three sectors,-*viz*; (*a*) the public sector, which has three state-owned or semi-state owned undertakings namely Hindustan Machine Tools (Private) Ltd., Bangalore, Machine Tools Proto-type Factory, Ambernath, and Praga Tools Corporation, Hyderabad; (*b*) the private sector consisting of 20 large-scale producers and (c) the small scale sector, which has a number of small engineering products of various types including machine tools of the ungraded variety. The total number of such units may be estimated at about 500.

The large scale producers including the public sector undertakings account for the entire production of graded machine tools in the country and the value of their total output as of 1957 amounted to about Rs. 2.35 crores. The corresponding figure of productions for the small units in the country is not available. However, on the basis of the position obtaining in the large scale sector, the total value of out-put may be estimated approximately at about Rs. 1 crore, consisting mainly of lathes, drilling and shaping machines of ungraded type.

Government had sometime back appointed a Committee to go into the problems of the machine tool industry and one of the tasks assigned to the Committee was to make an estimate of the demand for the various types of machine tools. The report of this Committee has since been published. The demand for various types of machine tools as estimated by the Committee can be taken as a broad basis for immediate planning, the general view in responsible quarters being, however, that these demands are likely to be exceeded very soon. The Committee had also recommended a rational programme of manufacture for the production of different machine tools required. In addition to the programme recommended for implementation by the existing units so as to enable them to be in a position to meet the increasing demands for those specific types of machine tools, the Committee had come to the conclusion that there was also need to create fresh capacity for the manufacture of certain types of machine tools. There seems to be considerable scope to embark on the manufacture of the following types:—

1. Light duty geared head lathes.
2. Bench lathes.
3. Drilling machines.
   (*i*) Pillar drilling machine.
   (*ii*) Radial drilling machine.
4. Wood working machines.
5. Sheet metal machinery.
6. Light duty and hand lever milling machines.

Although expansion is also required in respect of items such as heavy duty milling machines, different types of grinding machines and other general purpose machines, these have been excluded from the above list since arrangements are under way for implementing schemes to meet the growing demands for these items either in the public or in the private sector. The machine tools referred to in the list given above are comparatively simple items, which do not involve unduly heavy capital investments and it is considered, therefore, that these items could be successfully manufactured even on a modest basis.

Since, however, there are number of items of machine tools and all these items cannot be taken up successfully in one unit, the Working Group was of the opinion to set up 4 units with different items of production.

(2) *Manufacture of Printing Machinery*:—The printing industry in India unfortunately, is quite backward and out-dated primarily on account of the almost complete absence of printing machine industry. The regular import of printing machines at exorbitant costs has been a big drain on the foreign exchange to the extent of about Rs. 150 lacs annually.

The demand for printing machines druing the III Five Year Plan is estimated at a value of about Rs. 12 crores. Against this, the indigenous production of a few small and out-moded units at present existing in Amritsar, Madras, Coimbatore, Howrah etc., is estimated at a value of Rs. 60-70 lacs only. The gap quite indicates the bright scope for the development of the printing machinery industry.

There is not a single manufacturer of precision built automatic machines. The emphasis in the proposed factory would accordingly have to be given to precision built cylinders and platon machines for which there is no competition and for which the demand is by all proportions very heavy. On account of cheap labour, such precision built printing machines can be manufactured in India at competitive prices and accordingly the market of South-East Asia can also be captured.

(3) *Manufacture of Sugar Machinery*:—The present organisations of this industry in the country include units, which produce complete sugar plants as well as firms engaged in the manufacture of series of individual items. Total production of sugar mill machinery during the year 1958 was Rs. 171.5 lacs, whereas the import of machinery and plants during the same year was Rs. 726 lacs.

The Second Plan envisaged a production target of Rs. 250 lacs by 1960-61. A considerable volume of demand for sugar machinery will come from the needs of replacement. In addition there will also be sufficient demand from new units, which will be licenced during the next Plan period. In order to reduce the amount of foreign exchange involved in the import of sugar machinery, further expansion in the industry will be quite necessary. It may be estimated that sugar machinery worth Rs. 10 to 12 crores will have to be produced by 1965-66 in order to meet the entire requirements of the sugar mill industry.

Uttar Pradesh has got some 70 sugar factories scattered over the State. At present, much of the repair work has got to go to the Punjab, Bihar and Bombay, as there are no good facilities for such repairs in U. P. It would, therefore, be quicker and also transport would be less costly if all the equipment can be manufactured in U. P. In addition to the catering of demand in the State, efforts will be made in the proposed unit to supply machines to the other States of the country, where these machines are yet not being manufactured. Moreover, there are certain specific machines of the modern sugar plant, which could not be produced in India so far and are imported. The proposed factory may take up the manufacture of such complicated machines and parts, which would save foreign exchange worth lacs of rupees.

(4) *Manufacture of Wire Ropes, including Wire drawing*:—Wire ropes are important items of manufacture and are used in shipping, sugar industry and in other industries manufacturing industrial machinery. The total estimated demand for wire ropes will be 40,000 tons to 50,000 tons per annum during the Third Five Year Plan, against which the existing licenced capacity is about 11,000 tons only. And as such, the industry has got a scope and the proposed factory which would cater about 3/4 of the entire demand for wire ropes in the country, would save foreign exchange to the tune of about Rs. 50 lacs per annum, if established on a sound footing.

Wire of suitable gauges for the manufacture of these ropes will also be drawn in the proposed factory to produce successfully the desired products. Thus, the proposed unit will have two section (1) for the drawing of wire and (2) for the manufacture of ropes.

(5) *Paper Making Machinery*:—The value of the paper industry in all its different branches has been fully recognised particularly in terms of import substitution and there has been a steady decline in the import of almost all varieties of paper making machines. Although the Licencing Committee have already approved three schemes for the manufacture of plants for large scale paper production (50 tons/day), *viz.* the schemes of TELCO, Bird & Co., and Larsen and Toubro with an aggregate turnover of Rs. 5.84 crores/year, it will be noted that these firms will require several years to reach the peak production. Furthermore, the scheme of Larson & Toubro is a composite one, envisaging production in any or all of 13 principal industries. It may be reasonable to assume that their contribution for this particular field may be very much less than what has been envisaged above. Similarly for Bird & Co., the capital equipments to be installed are far from commensurate with turnover envisaged. They would depend to a very high extent on subcontract supply by other engineering firms.

In view of above and taking into consideration the anticipated large-scale expansion in the paper industry during the Third Five Year Plan, it is fetl that there are excellent prospects for the paper making industry and it is necessary to create additional capacity.

In the proposed factory, priority will be given to the manufacture of such specialised paper making machines, which are yet not being manufactured in India and are not of accepted standard, though in the later stages, it would specialise in the manufacture of composite plant for production of paper on large scale.

(6) *Ball and Roller Bearings*:—The Ball bearings industry in this country is hardly nine years old, the first and the only unit in operation, the National Bearing Company, Jaipur, having started production in August 1950. Considerable progress was made during this period in expansion and diversification of output under the shelter of protection granted to the industry, almost since inception.

Estimating requirements on the basis of the targets of production fixed under the Second Plan for various industries making use of ball and roller bearings and estimates of replacement demands, it was envisaged by the Planning Commission that the annual demand for ball bearings upto 2" bore diameter would be 2.4 million bearings by 1960-61 as against the requirements of 1.2 millions in 1955-56, as given in their 1956 report on the continuance of protection to the industry.

Ball bearings are used for fitment as original equipment in a number of industries like electric fans, electric motors, pumps, automobiles, tractors and earth moving machinery, textile machinery, sugar machinery etc. Due to the more intensive industrial activity that is being envisaged during the Third Plan period, the demand for these items can be expected to increase considerably. The demand for some of the manufactured goods which make use of the largest number of bearings like fans, motors, pumps, automobiles, diesel engines, tractors etc. is expected to expand more than double during the Third Five Year Plan, as below:—

Item.	Estimated demand.	
	1960-61	1965-66
Electric fans (000'nos)	900	2000
Electric motors (000'nos)	1	3
Power driven pumps (000'nos)	86	150

Automobile (000'nos)	57	100
Scooters, Motor cycles and Auto-rikshas (000'nos)	24	72
Three wheeler autorikshas (000'nos)	1.15	2.5
Chaff cutters (000'nos)	50	75
Diesel engines (000'nos upto 10 HP)	33	66
Textile machinery, ring frames, cards, power looms etc. (000'nos)	10	12
Tractors and Earthmoving equipment (000'nos.)	5	12

(7) *Manufacture of Medium Structurals including Cranes*:—Steel structural capacity in India was distributed among 73 factories (approximately) with the total annual rated capacity of about 1,37,000 tons in the beginning of 1957. A further capacity of 1,30,000 tons has been freshly licenced since January, 1957 by way of both expansion and new ventures and the total number of factories may be in the neighbourhood of 89 if all licences granted materialise as factories in operation in the next three years. About 60 per cent of the over-all capacity of structural works is located in and around Calcutta. The number of factories in Bombay area is about 29 with a total assessed capacity of about 50,000 tons per annum.

The structural fabrication work in Uttar Pradesh is, at present, more or less nil. Three licences have since been given in U. P., two for Railway goods wagon manufacturing and one for structural works with ultimate entry into wagon manufacturing. The two Uttar Pradesh licencees for wagon manufacturing, who are of Kanpur, are still in the stage of planning. One of these two licencees is reported to have abandoned the idea of establishing Railway wagon building works at present due to exchange difficulties and the operation of the deferred payment scheme.

AVERAGE ANNUAL IMPORTS OF FABRICATED STRUCTURAL STEEL IN INDIA

Year.	Value in Rupees.	
1951-52	6,00,00,000/-	
1952-53	11,00,00,000/-	Increase is because of import of structurals connected with steel plants.
1953-54	14,00,00,000/-	
1954-55	15,00,00,000/-	
1955-56	20,00,00,000/-	
1956-57	28,00,00,000/-	

It is evident from the foregoing that there is an increasing demand for Steel Structurals in India and the industry has got very bright prospects of future development. With the aspects of planned development of Nepal, the increasing demand for Steel Structural from the neighbouring States, such as the Punjab, Madhya Pradesh etc. and the demand generated in Uttar Pradesh itself consequent upon heavy expenditure on the Second Five Year Plan in respect of irrigation and river dam works, river training, road development plans, and the consequent bridge works and railway development plans, offers considerable scope for the development of this industry in Uttar Pradesh.

(8) *Grinding Wheels*:—At the commencement of the First Plan, there was only one factory producing Grinding Wheels in the country, namely The Grindwell Abrasives, Bombay, with an annual capacity of 360 tons. Thereafter, a new unit was set up in the name of M/s. Krishnalal Thirane & Co., Calcutta with a capacity of 240 tons per annum. The present capacity of the industry stands at 1,520 tons per annum, as against 750 tons in 1955-56.

There has been a marked increase in the demand for grinding wheels. With the increase in the industrial activity expected by the end of the Second Plan, it is estimated that the demand for grinding wheels will increase progressively from year to year. The target fixed for the Second Plan is 2,110 tons per annum against 800 tons fixed during the First Plan period. The demand for the Third Plan is estimated to be much more with the rapid industrialisation.

(9) *Scooters and Auto-Rickshaws (including Small I. C. Engines of 1 to 5 H.P.)*:—From the point of view of economic development of a country, manufacturing of auto-mobiles in bulk forms a nucleus around which all sorts of industries grow to give impetus to quick industrial development and progress in all spheres.

The capacity of this project has been anticipated according to the demand the industry has at present. The capacity of production of the proposed unit is 50 scooters a day in a single shift. If, however, the demand goes higher the mere addition of a second shift sould suffice for the production upto 100 scooters a day.

All parts of scooters and auto-rickshaws will be manufactured in the proposed unit including small I. C. engines of 1 to 5 H.P. capacity.

The cost of a scooter so manufactured will approximately come to Rs. 1,450/- against ex-factory cost of about Rs. 2,000/-.

(10) *Manufacture of Power Driven Pumps*:—Power driven pumps of various sizes and designs are used in several processes of manufacture. Efforts have been made to meet the country's demand for pumps through indigenous products, but it necessitates import of considerable quantity of these items, used on complicated and specialised jobs for sustained use. A scheme has, therefore, been prepared for the manufacture of pumps of all types on planned scale to meet the demand in the country, as much as the resources would permit. The project is expected to save foreign exchange to the tune of Rs. 75 lacs annually.

The demand for power pumps in future years is expected to record a sizeable increase in consequence of the general industrial bias of the Second Five Year Plan and particularly due to development programmes envisaged in the field of manufacture of industrial machinery, railway rolling stocks, ship building etc. It is therefore proposed to establish three units for the manufactur of power pumps, which would require a total investment of about Rs. 150 lacs on all the units.

(11) *Automobile Ancillaries*:—At the commencement of the Plan, only the nucleus of an ancillary industry existed in the country. The Tariff Commission (1953) recommended that for a healthy and balanced development of the automobile industry, ancillary industries should be developed for the manufacture of important components such as carburettors, fuel pumps, fuel filters, air cleaners, clutches, etc., in technical colloboration with foreign firms and that the number of units to be set up and the total capacity of each main component should be corelated with the actual or potential demand. It was also suggested that automobile manufacturers should purchase the products of ancillary industries in India for use as original equipment. Accordingly during the years 1954 and 1955 a number of ancillary units were approved or licensed for the manufacture of a variety of component parts. There are at present 20 important units which have been approved or licensed and some of them have already gone into production. Most of the remaining units are expected to commence production during the later stages of the Second Plan period. Some of these have secured technical collaboration of reputed firms in the United Kingdom, Germany and Sweden.

The future demand for an item like automobiles is difficult to be forecast with precision, since it is dependent upon several factors, some of which could not be exactly assessed for a long period extending over a quinquennium. The major factors which affect the offtake are (*a*) increase in the size of the higher income groups, (*b*) taxation policies at the Central and State Government levels, (c) price of vehicles and extension of hire purchase system and other devices to stimulate sales, (d) shortages in the availability of alternative facilities for transport of commodities and for passenger traffic, and (*e*) extention of State activities through nationalised road transport. On the basis of an assessment made in the later half of 1955, the demand for automobiles in 1960-61 was placed at 57,000 vehicles consisting of 12,000 cars, 40,000 trucks, omnibuses, etc., and 5,000 jeeps and station wagons. While the estimated demand for cars in 1960-61 might seem to provide for an expansion of 50 per cent over the offtake in 1954, it hardly represents more than a 20 per cent increase in comparison with the sales in the following year when there was a spurt in demand for automobiles. The Ministry of Commerce and Industry have recently suggested that the overall requirements for automobiles should be visualised by 1960-61 at 65,000 vehicles on the basis of a 100 per cent increase in the demand for cars over sales in 1955, *i.e.* offtake of 20,000 cars by 1960-61, as against the earlier estimate of 12,000 cars. It is felt by the Planning Commission that the trend of demand should be watched for some more time and the estimate of 57,000 vehicles by 1960-61 and the break-up thereof could, in the meanwhile, be made the basis for the development programme. The examination of the production costs, and other aspects of the automobile industry undertaken by the Tariff Commission at the instance of the Ministry of Commerce and Industry would provide in the near future valuable data for a review of the assessment of demand. The proposed unit would have a production capacity worth Rs. 75 lacs.

(12) *Manufacture of Domestic and Air Compressors*:—It was during the second world war that some beginnings were made in the manufacture of Industrial Machinery in India due to difficulties obtaining at that time in procuring capital goods. Subsequently, attempts were also made for the manufacure of Domestic and Air-compressors but the output so obtained is quite insufficient to cater to the requirement which is increasing year after year. No precise estimate of the demand is available but average imports of all types of commercial as well as domestic air compressors during the last two years have been of the order of Rs. 200 lacs. The indigenous products are not of accepted specifications and as such most of the requirement is met from imports.

The proposed scheme envisages manufacture of domestic and air compressors on an organised basis and scientific lines of production.

(13) *Establishment of Tool Room Workshops* (4 *Units*):—Tool Room Workshops are essential to meet the growing demand for improved tools and equipment and manufacture of dies, punches, jigs, fixtures and other special tools for a wide variety of industries will be undertaken in the proposed project to enable the industrialists to produce more and better quality goods. Manufacture of dies, jigs, gauges and fixtures is, no doubt, the basic step to be gone into for industrial advancement of a modern type.

On account of rapid industrialisation of the country and strict import policy, efforts are being made all over the country to produce more and more industrial machinery. In order to manufacture the machines and tools according to the required specifications and designs, establishment of tool room workshops is necessary, where not only the standard and accepted special tools, dies, jigs, fixtures etc. would be manufactured but also new designs and pattern would be evolved to bring the products at par with the imported ones.

The industries that could be serviced through a good tool room workshop by providing dies also are as follows:

Pressure Die Castings:—Manufacture of wide variety of articles. Hundreds of dies will be required.

Sheet Metal Industries:—Manufacture of a number of articles out of sheet metal and metal strips—aluminium and brassware utensils of various kinds and descriptions, articles like toys, wiring clips, washers, iron pans, electric irons etc. Here also hundreds of dies will be required.

Dies:—For forging presses in the manufacture of bolts, nuts, agricultural implements, drop forged articles etc., plastic toys by injunction moulding, tyres and clay models and the like.

(14) *Manufacture of Clocks and Watches*:—The clock is a time-measuring instrument in which an oscillating pendulum is employed as time counter; the term is applied also to stationary time-indicating mechanisms, controlled by a balance wheel and spring, employed either alone or in conjunction with other instruments. Watches are small sized portable instruments for personal wear or adornment and are used for purposes requiring the measurement of time.

The components of a clock or watch mechanism are: (1) a source of motive power, (2) a device for controlling and regulating the expenditure of power and (3) a 'train' for the transmission of motive power to the 'escapement' and time indicating device. The source of motive power may be a raised weight or a coiled spring, or it may be an electrical device. The motion is restrained by the intermittent action of the escapement and controlled by the swing of a pendulum or the vibration of a balance wheel and its spring. The train consists of a series of toothed wheels and pinions between the driving force and the escapement. In some cases, a striking mechanism is operated in conjunction with the visual recording machanism; and electrical signal, a paper reel, or other method for recording the time may also be employed according to requirements.

Practically, most of the requirements for clocks and watches are met from import. The Indian Clock Industry is still in its infancy. With a large internal market and the duty imposed on imports there is considerable scope for developing this industry in India. There is an increasing demand for master-cum-slave clock mechanisms required for use in public and commercial institutions. The manufacture of alternating current synchronous main clocks is easy, lending itself to small scale production.

Manufacture of clocks and watches would be taken up in the proposed factory on most modern and productive lines.

(15) *Manufacture of Railway Equipment Parts*:—Before the commencement of the First Plan, the Railways had undergone over a decade of most serious strain. The Plan was, therefore, mainly devoted to the rehabilitation and modernisation of rolling stock and fixed assets and only to a small extent to the provisions of additional facilities for meeting new needs. During the First Plan period, the total volume of traffic handled by the Railways went up from 91.4 million tons to nearly 114

million tons. Furthermore, the pattern of traffic also underwent some significant changes and there was marked increase in industrial and minerals traffic. The Second Plan estimated the total traffic requirements to be handled by the Railway by 1960-61 at 180.8 million tons. However, it was felt that with the resources in view the facilities provided by Railways may fall short of requirements by about 10%. Thus the target for goods traffic was placed round 162 million tons during the Second Plan period. In regard to passenger services, the Plan provided for an increase of 3% per annum or 15% over five years. The volume of goods traffic went up to 124 million tons in 1956-57 and to 132 million tons in 1957-58. For the year 1958-59 further increase of about 5 million tons has been estimated over the 1957-58 figure as against the anticipated increase of 12 million tons. Thus the total volume of goods handled by Railway during 1958-59 would come upto 137 million tons. With the steel works going into various stages of production and with agricultural crops being more promising it is expected that the additional demand for rail transport during 1959-60 would be about 14 million tons. Therefore, the orginating freight traffic which the Railways may be called upon to handle by the end of 1959-60 will be about 151 million tons. If the same tempo of development is presumed for the last year of the Plan, it is likely that an estimate of 165 million tons at the end of the Plan period will be achieved.

From present trends, unless there are some drastic changes in the distribution pattern of commodities, the development in the III Plan should involve a carrying capacity of 210-220 million tons or about 75,000 tons miles by 1966-67. Much will depend on the economic and efficient operation of the system besides maintaining substantial levels of investment.

The Railways have been making arrangements for the production of Railway spare parts in the private sector also and are giving work to both the large-scale and small-scale sectors. Items produced in the small scale sector and some specialised items in heavy industries sector need considerable improvement, as they do not meet the required standard and specifications. The above para clearly indicates the enormous development in the Railways and as such the existing capacity for manufacturing parts thereof is quite insufficient and needs expansion.

In view of the above, it has been proposed to set up a unit manufacturing Railway parts according to the standard and specifications laid down by the Railways. In fact, production of Railway parts on an organised large scale is an immediate need. Items of manufacture may be according to the requirements of Railways in different regions. If planned on scientific lines, the scheme would require an investment of about Rs. 50 lacs and would have an annual production capacity of goods worth Rs. 60 lacs. It would need power to the extent of 1,000 K. W. and would give employment to about 200 persons.

(16) *Road Rollers and Earth Moving Equipment*:—The large-scale programme for roads and industrial colonies and townships in the current as well as in the ensuing Plan periods has raised substantially the demand for road rollers and earth moving equipment. To accelerate the pace of road development programmes, sufficient additional capacity in the field of manufacture of road rollers and earth moving equipment would be essential.

(17) *Railway Coaches and Diesel Cars*:—The Railways exhibited a well organised mode of development during the First and Second Five Years Plans. The success achieved was enormous and it became a source of rather more planned development during the Third Five Year Plan.

The manufacture of Railway coaches and cars is being taken up on large scale at Perambur Coach Factory, M-G. Coach Factory, Hindustran Air Crafts, Integral Coach Factory etc. The total number of coaches required during the entire Second Plan period is estimated at about 11,575 or roughly 2,300 coaches per annum. On the other hand, the Railway Workshops and the workshops in the private sector have expansion programmes which will step up the capacity for coach-building to about 1,500 coaches per annum by the end of the current Plan period.

The above would reveal that even to complete the target fixed for the Second Five Year Plan, the existing capacity is not sufficient, requiring adequate additional capacity. To meet the considerably increased demand during the Third Five Year Plan, some large scale unit will be necessary. The proposed unit will take up the manufacture of Railway coaches as well as diesel cars to cope up with the growing demand. This would need a total investment of about Rs. 900 lacs for an annual production capacity of goods worth Rs. 1,000 lacs.

(18) *Transmission Chains*:—The demand for an item like transmission chains at the end of the Second Five Year Plan is difficult to be forecast as it is dependent upon some other industries in the course of development. The industry, however, needs additional capacity to meet the demand during the III Five Year Plan.

This is an important item of manufacture and would need a well planned mode of organisation.

(19) *Manufacture of Diesel and Electric Locomotives*:—Manufacture of locomotives is the most important item for the economical development of the Railways. The original capacities of the Chittaranjan Locomotive Works and TELCO have already been reached. It was proposed to step up the capacity of the former to three hundred locomotives and that of TELCO to 100 locomotives per annum during the current Plan period. With the increased output from these factories, largest supplies of locomotives are expected to be available from indigenous soruces but imports will continue during the Second Plan period. The products of these two large scale factories mainly confine to Steam Engine. For the manufacture of Diesel and Electric Engines also progressive efforts are being made but the demand for such engines from the Railways had been very low and as such, the industry was confined to Bombay region.

Since the Railways have now decided to introduce diesel and electric trains in the important Railway lines of the country, it would be essential to put up a factory which would cater adequately to this demand. The unit proposed would require an investment of about Rs. 1,400 lacs.

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11. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'METALLURGICAL INDUSTRIES'

Economy of Uttar Pradesh.

The setting up of metallurgical and engineering industries in Uttar Pradesh calls for special consideration. The State lies sprawled over 1,13,409 sq. miles and is populated by 6,32,15,742 people. Its population has shown a tendency of growing up at the rate of 11200 per million per year. At this rate it is estimated that its population would be 7,02,95,905 by the end of 1960 and 7,38,10,700 in 1965, *i.e.* at the beginning and the end of the Third Five Year Plan.

As against this growing population, the resources which will ultimately help to feed, clothe and house it, do not appear to be growing even a fraction as fast. These factors have resulted in the *per capita* income of Uttar Pradesh falling down in a slow but steady manner over a period of time when every nerve of the country had been strained in planning for its increase and when the *per capita* income of the country as a whole had been going up.

The main source of subsistence for the people of Uttar Pradesh had been so far its land and a different pattern does not appear to become operative here in the foreseeable future. With an alluvial deposit varying in its depth from about 6000 ft. to over 10,000 ft. the access of the people of this Pradesh to mineral and fossil fuel deposits could be hoped for only in its northern and southern fringes where the mountains and hills peep out through the alluvium. Unfortunately, even those hilly outcrops are restricted to comparatively such a small area and the little prospecting, which has so far been done in that area, has revealed such an insignificant number of items of not very great value, that it would be imprudent to pin the future progress of the State on the same. The planners in U. P. would have to look in other directions.

Industries—Their Importance to U.P.

If the *per capita* income is to be increased, and we do not see how any one can conceivably overlook such a necessity, fullest use has to be made of all the resources available here and the latest technique and the most efficient tools employed for this purpose. This envisages attack on the problem from two distinct but closely linked fronts. First, a thorough study and the fullest possible exploitation of all the resources of the State including human resources for producing all those innumerable items which are in daily need in this State or which happen to be in short supply or are dependent on imports, and secondly, the production and maintenance of all tools, plants, and machinery which shall have to be put to service in this connection. In other words what is needed is the simultaneous growth of secondary and tertiary, heavy and medium scale industries along with the small scale industries, each stimulating and supporting the other.

Industrial Policy of the Govt. of India.

The above mentioned basic considerations by themselves have been compelling enough. Paragraph 15 of the Industrial Policy Resolution of the Government of India of 30th April, 1956, beckons us in the same direction and works as an added urge. It is being quoted below:—

'In order that industrialisation may benefit the economy of the country as a whole, it is important that disparities in levels of development between different regions should be progressively reduced. The lack of industries in different parts of the country is very often determined by factors such as the availability of the necessary raw materials or other natural resources. A concentration of industries in certain areas has also been due to the ready availability of power, water supply and transport facilities which have been developed there. It is one of the aims of national planning to ensure that these facilities are steadily made available to areas which are at present lagging behind industrially or where there is greater need for providing opportunities for employment, provided the location is otherwise suitable .Only by securing a balanced and co-ordinated development of the industrial and the agricultural economy in each region, can the entire country attain higher standards of living.'

Basis of Planning.

The industries to be evolved and set up in U. P. during the Third and perhaps, even the subsequent Five Year Plan periods, would have necessarily to be worked out from this basic consideration. There is another approach, *i.e.* the fullest possible utilisation of resources. Both these approaches would have to be adopted in this State. The various proposals, which have been defined in this note, have been evolved with a view to work out the above objectives and to create and produce those items which are vitally needed by this State for its very life. The size of the various units should be worked out mainly on the above-mentioned basis, but enough flexibility should be planned for them so that these specialised tools of vital productivity could also be of service to the whole of India, on a small scale during normal times but having the potentiality of being pushed to greater lengths during periods of emergency.

Iron and Steel Industry in Uttar Pradesh.

The present day economy being based essentially on iron and steel, Uttar Pradesh should have a sizeable iron and steel industry of its own to meet its primary needs. As we do not have the basic raw-materials for making iron and steel, *i.e.* iron ore in quantitative sufficiency and of a good quality comparable with what some other States have, we have not so far thought of putting up a steel industry in U. P. But this is a mistake. While no doubt it would be incorrect, impracticable and uneconomical to set up giant steel plants in Uttar Pradesh, like those at Rourkela, Durgapur or Bhilai, it has already been agreed to set up a Blast Furnace in U. P. Also modern metallurgical technology offers techniques and plants for steel production which are suited to our circumstances, *i.e.* non-availability of iron ore etc. It has also to be remembered that even countries like the U. K. built up their industry on raw material imported from other countries. In our case we shall be depending only upon a neighbouring State of our own country.

The iron and steel processing industry, as envisaged for immediate setting up in U.P., is to be built up mainly on the scrap supplies and would look after the maintenance of the extensive machine lying sprawled all over the State in the form of transport agencies, both railway and road, and the existing factories, by fabricating the various replacements which every machine normally needs. The railways are planning, of their own accord, to set up two factories for manufacturing wagons and the parts thereof and components for locomotives. The first factry would be at Bareilly and the second near Varanasi. The metal processing industries, which are strongly recommended for being set up in this State, further on this note, would be of considerable assistance to the above two factories of the Indian State Railways, as also to the many others e.g. factory for the manufacture of agricultural machines and implements, tools and implements for sugar factories, tanneries etc. which, it is hoped, the Government of India would be setting up in Uttar Pradesh in the Third and subsequent Five Year Plan periods.

The types of steel needed for our vairous requirements would be of following categories:—

(1) Steel castings.

(2) Billets for rerolling (Although billets for rerolling would be, and are being, produced by the main iron and steel producers, this facility would have to be provided in the units to be set up in this State as such a facility is essential for the overall balancing of our economy and for using up the steel scrap, produced all over the country, which the primary steel manufacturing units can never use, and for rolling those sections needed in comparatively small quantities which the bigger units would never do).

(3) Ingots and billets for forging.

(4) High carbon steels.

(5) Alloy steels.

(6) Stainless steels.

(7) Ferroalloys.

All the items listed above are employed in the manufacture of different types of machines and equipments used in the every day life of a country. There are few machines which can be made without the use of steel in one or more of the above forms. The manufacture of the above items is thus a matter of importance for not only Uttar Pradesh but also for the whole of India.

Stainless steel, one of the items listed above, is of special interest to this country because it can be used for making domestic utensils. Uttar Pradesh provides a very good market for these utensils, in the preparation of which a large number of people are engaged. Moradabad is one of the centres for the manufacture of household utensils made from brass. Brass is composed of copper and zinc. In a closely related alloy used for domestic utensils, tin is also used. Both zinc and tin are at present entirely imported. A portion of copper used is made in the country but even that is not enough. The rest is imported. Unfortunately, copper has a rival use, *i.e.* in the electrical industry where it is used in an extra pure condition and for making of bearings where it is used with tin and zinc. Electrical machines and bearings being extremely vital, it is very much desirable to divert all copper, produced in the country or even imported into it, to the electrical industry and for the manufacture of bearings. Domestic utensils should be made from other material which may be found in India in abundance and which could replace brass both by its properties and cost.

Stainless steel serves this purpose admirably, especially that variety of stainless steel which does not contain any nickel. It is best suited for making domestic utensils so far as its properties are concerned and, if its manufacture is properly handled, the cost too would not be very much more than that of brass to be offset by its comparatively longer life and better popular appeal. Intensive efforts should be made to manufacture chrome-manganese stainless steel in the form of sheets and circles, for ultimately processing it into domestic utensils. For the manufacture of this stainless steel it would be necessary to provide for either electrolytic manganese and chromium or low carbon ferromanganese and ferrochrome. The ores for both chromium and manganese are in Orissa.

The manufacture of these materials might either be arranged in Orissa itself or in the Uttar Pradesh.

Electric Arc-Furnaces.

The basic tool needed for the manufacture of the items listed above is electric arc-furnace. Such furnaces would melt steel either from steel scrap, which is even now available but not fully used in as much as about 100,000 tons of scrap is being exported annually and the availability of which would increase as and when the new Government Steel Plants get in full stride and when the overall economy of the country gets a resultant boost, or even from pig iron of which there is already a plenty. In fact, recent statistics show that a larger quantity of steel scrap is being exported.

The metal produced by these furnaces would pass through different stages of working to the finished products which are made by iron and steel. Therefore, these units would have working alongside Cupolas, Foundry, Forges, Machine shop and Heat treating arrangements. These will specialise mainly in the production of tool and alloy steels and would serve to feed the secondary and tertiary industry which is required to be set up for strengthening the economy of the various regions of this State.

Location of Electric Arc Furnaces.

There is a need for at least five units of such electric arc furnaces in Uttar Pradesh during the Third Five Year Plan period. It is recommended that they may be set up at five different places in U. P., the exact location being decided by economic consideration and the availability at the site of electric power and rail head. Since these furnaces are to work on steel scrap, its availability should always be kept in mind. Big railway centres are known to be a good source of steel scrap supply. Therefore, unless ruled out by other considerations, these units should be located as close to such centres as possible. The following places in Uttar Pradesh are considered suitable for the location of these furnaces. Although these places signify certain individual cities, they should be taken more or less symbolically indicating particular regions:—

(1) Meerut.

(2) Agra.

(3) Bareilly.

(4) Mirzapur.

(5) Gorakhpur.

Meerut:—is representative of the Western U. P. with mechanical skill fairly widespread. Quite a few industries are already working all over that region wedded to agriculture and more are waiting for the proper opportunity to appear. The unit at Meerut would be of great service to that region in as much as it would provide materials, machines and tools which are required to be imported or for which an unfulfilled want exists at present.

Agra:—situated at the gate-way to Rajasthan, caters not only for its hinterland in this State, but even for that part of Rajasthan of which it is a hub. The unit proposed for Agra would cater for the entire region including Rajasthan.

Bareilly:—situated in the Western sub-mountain region of Uttar Pradesh, has been chosen as the seat for another unit. It would cater for the already widespread dotting of activities, which are a feature of that region, including the various industries which are being planned for being set up in that part of the country during the Third Five Year Plan period, *e.g.* the Wagon-building workshop of the Railways and the Synthetic Rubber Plant, both of them at Bareilly. The Tarai portion of Uttar Pradesh, with its reeking vegetation and marshy and malarious land, is the only area which could be won over to augment our hard-pressed cultivable land for agricultural purposes. This tract extends from the north of Saharanpur in the west to the north of Deoria in the east. Towards this end the entire array of agricultural, irrigational and earth-moving machines and tools would be needed. The unit at Bareilly in the west and Gorakhpur in the east would have the main responsibility to produce and sustain such an apparatus.

The unit at Bareilly has yet another purpose; stainless steel would be produced at this place. The proximiy of Bareilly to Moradabad, a centre of manufacture of domestic utensils and therefore, a ready and rich market for the stainless steel sheets, has been the main consideration in locating the unit for the manufacture of stainless steel at this place. The unit at Bareilly should be equipped with a modern rolling mill to make stainless steel sheets.

Mirzapur:—The site near Mirzapur appears to be an obvious choice because of its proximity to the industrial centre at Rihand with its Aluminium Smelter, Cement industry and other industries which, we are sure, would ultimately spring up there. Ferro-alloys especially ferro-silicon would also be made there.

Gorakhpur:—The unit at Gorakhpur would cater for the entire north-eastern region, which because of its comparative backwardness, is very much in need of such manufacturing units.

Details of the Electric Furnace Units.

The units we propose would be composed of electric arc-furnaces. They would be multipurpose having castings, forging, rolling and machining aids to be set up as required by the needs of the development plans of those regions. The electric furnaces would be ultimately of ten ton capacity at each location, in five ton units, *i.e.* two five ton furnaces at each of the five locations. With one unit there would be two steel melting arc furnaces of 5 tons capacity each, two five-tons Cupolas, a grey iron foundry and a forging shop. The second unit would have two five tons electric furnaces, two five tons Cupolas and both iron and steel foundries. The third unit would have two five tons electric furnaces, two five tons Cupolas with a steel foundry and a forging shop. Each one of these units would cost about Rs. 100 lacs and would produce 15000 tons of the finished steel product per annum in addition to grey iron castings. The fourth unit would consist of two five tons electric furnaces for making stainless steel, a steel foundry and a rolling mill for rolling stainless steel sheets. Its cost would be Rs. 150 lacs and annual production 10,000 tons. The Fifth unit would consist of two 12 tons furnaces with a merchant-cum-billet mill for rolling steel ingots into billets and rods. The size of the furnaces has been kept big, because they would have to feed the merchat-cum-billet mill attached to them. Although all the primary producers of steel in India, i.e. Tatas, I. I. S. Co., Government Plants at Bhilai and Durgapur, have mills which do these jobs, it has been considered desirable to recommend its setting up in U. P. as well. The five steel furnace units would mostly manufacture alloy steels which could not be ultimately consumed unless rolled down to the proper sizes. The total quantities likely to be produced in all these units of steels of a particular specification and section, would not be so large as to be possible to be rolled down in the merchant mills of the large steel plants. It would have to be handled in a special rolling mill to be set up for this purpose. The mills attached to the big steel plants are tailored items. For that purpose merchant-cum-billet mill is absolutely necessary. To keep a mill even of a small capacity, engaged, it is necessary to have the steel melting unit of proper capacity. This merchant-cum-billet mill would be capable of rolling billet of 2" to 2½" section from small ingots. In Uttar Pradesh, there are quite a few small re-rolling mills but there are no billet mills. These re-rolling mills do not run to their full capacity for want of billets of sizes which these mills could roll. Although with the setting up of the new steel plants this position would ease considerably, there would still be a need for billet producing capacity in Uttar Pradesh, out of ingots made at the various steel melting units to be set up here. A merchant-cum-billet mill of a very moderate capacity would roll roughly not less than 3000 tons a month and to provide so much of steel would need two twelve tons furnaces instead of two five tons furnaces. The annual production of this unit would be about 38,000 tons and it may cost as much as Rs. 200 lacs.

The Government of India has recently announced its decision to have twenty five electric furnaces set up in the country. The five units of electric furnaces, mostly pairs of five tons capacity and only a pair of twelve tons capacity, recommended above, could easily be set up in U.P. and they could be counted to belong to those furnaces which have been sanctioned by the Government of India.

The Government of India has planned to set up an alloy steel plant either at Bhilai or Durgapur of 40,000 tons capacity. Out of this, 25,000 tons would be stainless steel and 15,000 tons high speed and carbon steels etc. There is already a capacity for the manufacture of about 15,000 tons spring steel and about 38,000 tons of other alloy steels. Some of it already exists and the rest has been licensed. The present demand for alloy steel is over 130,000 tons for the entire country, which is being met solely by imports. This includes silico-manganese steel, silicon steel, high speed steel etc. Considering even today's demand there is a very large gap which has to be filled up by internal production. By the time the facilities, recommended above, are set up and become effective the gap would be widened very considerably. That unsatisfied demand would either have to be met by imports or the production facilities would have to be very much increased. From the point of view of all India requirements the above recommendations may be considered as extremely meagre and insufficient, but they are a fairly reasonable start so far as this State is concerned. Similar is the case with stainless steel. The Government of India Alloy Steel Plant is expected to have an annual capacity of 10,000 tons of stainless steel. The existing and potential demand of India for this item is far much more. If, as has been visualised in this note, stainless steel replaces brass in the making of domestic utensils the demand for stainless steel would become tremendous and the plant recommended for U. P., which would be able to meet the existing demand for stainless steel, would become utterly inadequate and would have to be supplemented by several such plants.

Ferro Alloys.

For the unit to be set up near Mirzapur one electric furnace is recommended which should be of a type which could make ferroalloys. This would be in addition to the two furnaces already contemplated for that place. The ferroalloys in maximum demand are ferromanganese and ferrosilicon. The former is being made elsewhere and Uttar Pradesh is not a place where its manufacture could be feasible. Ferrosilicon should, however, be made in U. P. Bhadravati is the only place where it is being made at present. At present only 5,000 tons are being manufactured, but the production would soon be going up about five times. Even this increased production will fall far short of the actual requirement when all the steel plants come into full operation. The need for a ferrosilicon plant is thus very obvious. Mirzapur area has or would soon have all the three raw materials for making ferrosilicon—(1) silicon, (2) coal or charcoal, and (3) cheap electric power. We except that this State itself would ultimately have use of atleast half of the production of that unit.

Aluminium Production.

Mirzapur area has one more importance. Close to Rihand Dam would be set up, within a year or two, an Aluminium Smelter for making about 20,000 tons of aluminium per year. All this tonnage would have to be processed for end uses. Aluminium and its alloys are now very close to steel in importance. They are light, strong and plentiful. Their cost is low. Being heat-treatable like steel, their physical and mechanical properties could be adjusted to suit any particular purpose. In looks, aluminium alloys are better than steel and in weight they have an advantage over steel. Per unit weight aluminium alloys are stronger than steel. In resistance to corrosion they are very much superior to steel. But for the light aluminium alloys the modern aircraft would not have had the same place in our lives. In automobiles and railways aluminium and its alloys are taking a predominant place. For all these purposes aluminium to be produced in U. P., would have to be processed and adopted. The equipment which would do this processing would comprise of rolling mills, aluminium alloy making and fabrication plants (*i.e.* furnaces, forges, foundry, extrusion units and heat-treatment plant) as well as equipment to make aluminium powder. These units which require large quantities of aluminium and/or power should be set up near the smelter. Presses etc., for making domestic vessels out of Aluminium sheets and circles, would have to be set up near the consumption centres and at places where necessary skill is already available.

Spun Cast-Iron Pipes.

We recommend further the setting up of a unit for making cast-iron spun pipes in Uttar Pradesh. The actual production of spun pipes is far less than the demand and although a few such units are being planned to be set up in the near future, the entire production as it would then be, would not be enough to meet our demand. Uttar Pradesh itself would need 21,000 tons of these spun pipes of 3″ to 12″ diameter. A plant should have an annual capacity of 15,000 to 20,000 tons and a start should be made with making only pipes of 3″, 4″, 5″, 6″, 8″, 10″ and 12″ diameters.

Manufacture of Rolls.

Rolls have been manufactured in India since the beginning of the last great war, but they have been able to cater for only a fraction of the demand. At a time when the demand for rolls of all the varieties is going up due to the very great expansion of the steel industry, the existing roll making industry is not expanding in proportion. There are reasons to believe that a contraction is actually taking place. A roll making industry ought to be set up at any one of the five places where the electric furnaces have been recommended to be set-up. Although they could be anywhere in U.P., their manufacture is extremely specialised and therefore would have to be concentrated at one place in the interest of efficiency. Being nearest to the source of raw material, pig iron, steel scrap, coal and coke, as well as the places of consumption of the finished product, *i.e.*, the steel rolling mills, Mirzapur appears to be the best site. Some of the steel rolls used in the steel mills are so heavy as 50 tons a piece, such as the blooming roll. Barring such rolls, for the manufacture of which a 100 ton furnace is needed, all the steel and cast-iron rolls should be made at that foundry. The manufacture of chilled iron rolls may be taken up as a start and the manufacture of steel rolls could be added to that as and when requisite skill is built up.

The question of setting up metallurgical industries brings in its wake the problem of manufacturing Graphite Electrodes.

Graphite Electrodes.

Our recommendations, when carried out in full would mean a production of slightly over 100,000 tons of steel, which would need about 600-700 tons of electrodes. Considering the entire country, we might base our calculations on the requirement of electrodes being ultimately in the neighbourhood of 2000 tons per annum on a conservative reckoning. At present, no electrodes are being made in the country. The raw material for these is petroleum coke, and the manufacture is rather heavy on electric power. It is hoped that with the setting up of the various refineries, petroleum coke would not be so scarce as it is at present. Efforts should, therefore, be made to set up an electrode manufacturing plant. The best place in Uttar Pradesh for such a plant would be Mirzapur area where power could be made available cheaply.

Silicon Carbide.

Incidental to the above metallurgical industries is the manufacture of silicon carbide (used as an abrasive as well as a heating element) and aluminium (abrasive). The former commodity is not being manufactured in India at the present moment and is being imported to the extent of more than 1500 tons a year. It is recommended that a plant for manufacturing 1500 tons of Silicon Carbide a year be set up in this State. Aluminium is also used as an abrasive and this commodity is not being produced in the country. With the setting up of the Aluminium plant near Rihand in Mirzapur district alumina would be available in plenty and a part of that supply could be diverted towards the manufacture of alumina abrasives. Like graphite electrodes they consume a considerable amount of electrical energy. The only possible location for these plants is the Mirzapur area near the Aluminium Smelter and the Graphite Electrode plant.

Brass Rolling.

Uttar Pradesh consumes a sizeable quantity of brass sheets. Although a portion of its demand is being met by a material made locally from scrap, the bulk has to depend on imports. Even the quality of the material made in the State in small manufacturing units is not very good, and all those articles wherein standard brass or phosphor bronze sheets are used are either imported as such or made from imported sheets. It is therefore recommended that a plant comprising of a copper-alloy melting electric furnace and sheet rolling mills be set up anywhere in Uttar Pradesh, so as to be able to produce 2500 tons of sheets per year. The power needed for the purpose would not exceed 1500 K. W. and the cost would be about Rs. 35 lacs.

Nickel-chrome wire is used for making furnaces, operated electrical-

Nickel Chrome Wire.

ly for use upto about 900° C. A fairly large number of such furnaces are operating in the country and their proper maintenance is becoming a problem for want of Ni-Cr wire. As Nickel is not yet known to occur in India, it is possible to think of manufacturing nickel or its alloys in this country, but a small unit might perhaps be thought of for drawing out Ni-Cr wires of various gauges from imported Ni-Cr rods. This would also be used for drawing of wire for nails etc. Such a unit should be set up in one of the Industrial Estates in Uttar Pradesh.

Exploration of Copper.

Next to iron and aluminium, copper is the most important metal. It is learnt that there are certain deposits of copper-bearing mineral in the form of hydrated carbonates and sulphates of copper in the Almora and Garhwal districts. It is extremely desirable to have detailed prospective exploration of these deposits and this Group feels that utmost vigour should be put in this work so that all the details are made available in the early part of the Third Five Year Plan period.

Power Requirements.

Taking 400 to 500 KVA as the power requirement per ton of an electric furnace all the different electric furnaces alone would need 35,000 KVA. The ancillaries will take another 1,250 KVA. The electrolytic manufacture of manganese and chromium as well as the manufacture of silicon carbide, fused aluminium oxide and graphite electrodes will also take substantial power. Detailed requirement for each unit would entail a large amount of labour, and is not possible to be worked out within the short time at our disposal. Only tentative figures have been given in Proforma X. The items which would be responsible for the bulk of power requirement are (1) Graphite Electrodes (2) Silicon Carbide and (3) Electric Arc-Furnaces.

Finances.

Working out the details of money required for executing and running each project recommended above, would again need a lot of data which is not available easily at the moment. There is, unfortunately, no time at our disposal to work out these details. We can, however, say in a very rough way that the capital cost of each unit of two furnaces with its ancillaries would be about Rs. 100 lacs each. The rolling of stainless steel would cost about Rs. 50 lacs in addition. Thus the unit for making stainless steel sheets would cost about Rs. 150 lacs. The unit having two 12 ton electric furnaces and a merchant-cum-billet mill is likely to cost about Rs. 200 lacs. The ferroalloy plant is likely to cost Rs. 20 lacs. The spun cast iron pipes plant is expected to cost Rs. 40 lacs. The brass and prosphor bronze sheets rolling plant is likely to cost Rs. 35 lacs. The aluminium alloy (as well as copper and brass) extrusion plant and the aluminium alloy foundry, forging shop and heat-treatment unit are expected to cost Rs. 62.6 lacs. The manufacture of graphite electrodes and silicon carbide units would call for about Rs. 200 lacs. The roll foundry and the nickel wire drawing unit would account for Rs. 30 & Rs. 5 lacs respectively. All these figures give a rough estimate of the capital cost of the units, and do not give the working costs, which may tentatively be put on a very rough basis at about 200% per annum for electric furnace working as a separate unit, and an average of 100% per annum of the capital cost for the units taken as a whole.

Raw materials.

For the running of the five units of electric furnaces for a year about one lac tons of steel scrap and five to ten thousand tons of basic pig iron would be needed. For other activities of foundries another about 20 thousand tons of pig iron of various varieties and 15,000 tons of steel scrap of a fairly good character would be needed per year. For the cast-iron spun pipe unit, about 20,000 tons of pig iron would be needed per year. In addition about six to seven hundred tons of graphite electrodes and different amounts of ferroalloys, fluxing material, fuel (coal, coke and oil), moulding material and refractories would be needed. There should be absolutely no difficulty in getting them. It should naturally be the aim of the country to manufacture all that is imported for this purpose if proper raw materials for the same are available.

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12. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'MINERALS'.

The Working Group-XII (Minerals) was formed under the Heavy Industries Plan Committee to assess the present position of minerals, and to devise ways and means of intensifying prospecting programmes for proving mineral deposits to establish industries in Uttar Pradesh. In the last few years, investigations conducted by the Geological Survey of India, Indian Bureau of Mines and the State Directorate of Geology and Mining have indicated that though we are deficient in minerals like coal and iron, there is plenty of scope for finding quantities of copper, asbestos, lead, limestone, clays, soapstone, magnesite, gypsum, quartz, felspar etc. for feeding the industry. While we can say with certain amount of accuracy regarding reserves and quality of minerals like clay, limestone, magnesite, gypsum and soapstone, the other mineral deposits still lie in the preliminary prospecting stage of which very little is known.

Concerning mineral investigations, the policy laid down was discussed in the Zonal Council meeting of the Indian Mineral Advisory Board. The Council considered the distribution of work as follows: (a) The Geological Survey of India would carry out detailed regional mapping of formations and indicate in a general way, the possible economic mineral deposits. (b) The State Directorate would then take up investigations from the stage for prospecting work which will include detailed mapping, sampling by pits, trenches and drilling. (c) The Indian Bureau of Mines comes at the final stage of exploration. This policy has so far not been rigidly adhered to, and the co-ordination of work of the Directorate of Geology and Mining with the Central organisations was, however, finalised after a meeting held at Calcutta last year. It was decided that the investigations already in hand with the Central organisations would be completed by them, while work on other major and minor minerals would be undertaken by State organisation. The Directorate of Geology and Mining U.P., was also informed that due to shortage of staff, equipment and other immediate commitments, it would not be possible for the Central organisations to take up fresh investigation programmes in Uttar Pradesh. There is now, definitely, an urgent need for the expansion of the State organisation in order to intensify field investigations which could be undertaken in our vast mineral areas.

The scheme for expansion of the Directorate of Geology and Mining in the III Five Year Plan submitted to the Government was prepared on the basis of 66% increase on ceiling. The physical targets thus aimed at were low, and a small percentage of work proposed would be completed at the end of the III Plan. There is an immediate need for industrialisation, especially, in Uttar Pradesh. It is imperative then, to provide more facilities by way of trained technical staff and equipment to intensify the programme for mineral development.

In the first meeting of the Working Group XII, deliberations were made on the several reported minerals of Uttar Pradesh. It was decided that nucleus reports on the position of iron and coal, copper, asbestos, raw materials for cement and ceramic industries, magnesite, sulphur and rock phosphate in our State should be prepared by different members of the Group. A proposal was also made for creating a Mineral Development Corporation, and a small unit for Pilot Plant Study of Minerals.

In the second meeting of this Group, on reviewing it was found that while considerably detailed investigations had been completed on some minerals, the others were still in the preliminary stage of prospecting. Detailed investigations of only those mineral areas were recommended which were easily accessible, and where exploitation would be economically possible for the immediate and future need in industries like the ceramic, cement, glass, industries for the manufacture of refractories, insulators, sanitary wares, porcelain crockery etc. The items concluded for detailed investigations by the Working Group are summarised below in order of priority:

1. *Investigation of fire clay deposits of Bansi and raw materials for the ceramic industry.*

Fire clay.

While appraising the previous reports, geologic as well as chemical on the Bansi clay, it was considered that sufficient work had been done to establish moderate reserves suitable for use in the refractory industry. The requirements for refractory bricks are increasing in our country, specially due to the expansion of steel industries. In Uttar Pradesh, however, the main consumer is the Churk Cement Factory whose needs are also being met from other States.

A proposal has been made to establish refractory brick manufacturing plant that will utilise the Bansi clay. It was, however, considered imperative that detailed investigation by mapping, pitting, trenching and drilling be completed to assess the true reserves and quality of clay available. The financial implications of this work have been dealt with in detail in the nucleus report prepared.

Ceramic Minerals.

Ceramic industries in Uttar Pradesh were initiated several years ago. The large scale expansion of this industry, as well as establishment of other allied industries are now being planned. The raw material requirements have so far been met from other States at a higher cost and at the risk of fluctuating supplies. These minor minerals have received very little attention in the past. However, it is felt that a stage has now come when constant and cheaper supplies of the ceramic raw materials will be required in order to successfully implement the industry.

Several deposits of these minerals are known in our State. However, very little is known regarding their quality and quantities. It was therefore the recommendation of the Group that detailed geological investigations be undertaken to establish sources and reserves for their utilisation in indutsry. The financial requirements for investigation of fire clay and materials for ceramic industry are summarised below:

	Total financial requirements. (in rupees)	Foreign Exchange. (in rupees)
1. *Staff*:		
Technical and Managerial	2,42,700	..
2. *Equipment*:		
Drills, compressors, surveying equipment, tentage etc.	2,77,800	1,57,000
3. *Contingencies*:	2,00,000	..
Total :	7,20,500	1,57,000

2. *Investigation of limestone, marble and calcite in Dehradun, Garhwal and Mirzapur districts.*

Concluding the deliberations of the Working Group on the position of cement industry, it was the considered opinion of the members that there is no shortage of cement in India at present. Uttar Pradesh, however, still falls under short supply zone owing to transportation difficulties. With the proposed expansion of the Churk Cement Factory it was said that our State would be able to meet slightly less than half of our requirements. It is, therefore, essential to establish a factory in the northern sector of Uttar Pradesh to meet the requirements, as the railways have a rigid policy concerning the transportation of cement to long distances.

Proposals were also made for establishing chemical industries for the manufacture of Calcium Carbide etc., for which the raw material required is pure limestone in the form of marble or calcite. Enough preliminary work has been done and the deposits are found promising.

It was the considered opinion of the Group that detailed, investigations be undertaken for finding the necessary raw materials for meeting our present as well as future needs that will arise after the commencement of several engineering projects planned. The financial aspect of the requirements of qualified technical staff and equipment is:

	Total financial requirements. (in rupees)	Foreign Exchange (in rupees)
1. *Staff*:		
Technical and Managerial	3,68,000	..
2. *Equipment*:		
Drills, compressors, surveying equipment, tentage etc.	4,48,000	2,51,000
3. *Contingencies*:	3,60,000	
Total :	11,76,000	2,51,000

3. *Investigation of marls in districts Unnao, Rae Bareli, Sultanpur, and Lucknow.*

Along with the proposal for setting up large scale cement factory in northern Uttar Pradesh, schemes have also been drawn up to utilise deposits of calcareous loams, called marls that occur in the Unnao, Lucknow, Sultanpur and Rae Bareli districts. According to preliminary reports of the Geological Survey of India, large deposits of this calcareous material can be expected for utilisation in small scale cement industries, and the existence of these deposits near big industrial towns of our State is a great advantage. Small cement producing units can be set up to feed the large adjoining consuming areas at comparatively low cost, and would act as an incentive to building programmes.

As only preliminary estimates of reserves and quality of raw material are available, it was considered essential to intensify field investigation for detailed assessment of these deposits. The geological work will consist of very extensive pitting, sampling and mapping for proving purposes, and the following requirements of staff, equipment and contingencies would be essential for implementation of the scehme:

	Total financial requirements. (in rupees)	Foreign Exchange. (in rupees)
1. *Staff*:		
Technical, Managerial and Inferior.	88,000	. .
2. *Equipment*:		
Pump, jeep, tentage etc.	72,000	. .
3. *Contingencies*:	1,58,000	. .
Total :	3,18,000	. .

4. *Investigation of Gypsum in Tehri-Garhwal and Naini Tal districts.*

Gypsum is an essential raw material for the manufacture of fertilisers and cement. Resources thereof, with the partition of India have become rather poor. In Uttar Pradesh, it is mainly utilised in the plaster of paris and cement industries, and so far our requirements for cement manufacture are being met from other parts of the country. With the establishment of cement and other allied industries in the State, our needs are expected to rise manifold.

Deposits of Gypsum are known in several localities in Tehri, Pauri Garhwal, and Naini Tal districts. However, no detailed quantitative and qualitative estimates are available. To meet the expected demand of this essential raw material, it is considered imperative to carry out detailed geological investigations for proving of our resources for the industry. There will, therefore, be a need for additional staff and equipment, the financial aspect of which is summarised below:

	Total financial requirements. (in rupees)	Foreign Exchange. (in rupees)
1. *Staff*:		
Technical, Managerial and inferior.	1,83,000	. .
2. *Equipment*:		
Diamond drill, tentage, jeep, etc.	2,70,000	1,60,000
3. *Contingencies*:	2,10,000	. .
Total :	6,63,000	1,60,000

5. *Investigation of Magnesite in Almora district.*

Basic refractories are the urgent need of the expanding steel industry of India. Our requirements though partly met by our products, are mostly imported. Dead-burnt magnesite can be used as such for the ramming of floors of furnaces in the manufacture of steel. Uttar Pradesh has several deposits of magnesite. However, a suitable material with low silica and lime contents has to be proved. A plant for the manufacture of dead burnt magnesite has been planned, and it is essential that detailed investigations be completed to meet the raw material requirements of this industry. The requirements of staff and equipment are summarised below:

	Total financial requirements. (in rupees)	Foreign Exchange. (in rupees)
1. *Staff*:		
Technical and Managerial.	2,24,000	..
2. *Equipment*:	3,55,000	2,18,000
3. *Contingencies*:	3,01,000	..
Total:	8,80,000	2,18,000

6. *Investigation of copper in Almora, District.*

During the past, copper was being actively mined from the Himalayan tracts of our State. Old copper workings have been reported in a belt forty miles in length between Bageshwar and Pithoragarh in Almora. Another belt between Bhilanganga and Dhanpur occurs in Garhwal. According to the preliminary reports of the Geological Survey of India, the deposits of Almora are considered promising. In order to prove the economics of the Almora copper deposits, detailed investigations, mapping, trenching and pitting, geo-physical prospecting, drilling and exploratory mining will have to be done.

The Geological Survey of India have commenced detailed investigations in a part of Almora area, and in order to intensify the work, the Geology and Mining Directorate should collaborate with the Geological Survey of India by taking up other localities in the Almora district. Additional staff, equipment and contingencies will be required during the III Plan period for intensifying investigations on copper in Almora, and the statement below gives in brief the financial requirements.

	Total financial requirements. (in rupees)	Foreign Exchange. (in rupees)
1. *Staff*:	3,05,000	..
2. *Equipment*:	8,25,000	6,50,000
3. *Contingencies*:	6,50,000	..
Total:	17,80,000	6,50,000

7. *Expansion of the Geo-Chemical Laboratories in the Directorate of Geology and Mining, Uttar Pradesh.*

With the commencement of intensified field operational activity for proving of mineral deposits, expansion of the existing small chemical section in the Directorate is essential. It is estimated that the analytical work to be carried out by this laboratory would increase 3 to 4 times as compared to the present Plan period. A brief statement of the financial requirements for the expansion of the chemical laboratory is given below:

	Total financial requirements. (in rupees)	Foreign Exchange. (in rupees)
1. *Staff*:	1,54,000	. .
2. *Equipment*:		
Furnaces, chemicals, Platinum wares, balances.	1,08,000	25,000
3. *Contingencies*:	1,28,000	. .
Total:	3,90,000	25,000

8. A. *Scheme for Development and Pilot Plant study of minerals.*

Minerals for their utilisation in the industry will have to be tested in great detail and examination on a pilot plant scale is essential. It is an accepted principle that minerals should be treated chemically and physically before they are placed for the industry. Researches, tests for beneficiation, designing of suitable plants and other industrial experiments of this nature are necessary to establish an industry on sound footing. Highly technically qualified staff, equipment, contingencies and a building would be required. A summary of the financial requirements is given below:

	Total financial requirements. (in rupees)	Foreign Exchange. (in rupees)
1. *Staff*:	4,95,000	. .
2. *Equipment*:	6,00,000	3,00,000
3. *Contingencies*:	3,30,000	. .
4. *Building*:	5,00,000	
Total:	19,25,000	3,00,000

8. B. *Scheme for exploitation of minerals in ores not rich in them by floatation method.*

A scheme for determining simple and economical procedures for concentrating minerals from their ores by floatation mthods has been submitted by Dr. M.C. Rastogi of Lucknow University, who has stated that the necessary researches could be conducted in the Department of Chemistry of the University. It is considered necessary to conduct basic researches in this field before the raw materials are tried on a pilot plant or commercial scale. A scheme of this order would be of help as researches would form a basis for treatment of ores on pilot plant scale and would reveal the possibilities of making available to the industry, raw materials that were so far considered impure. Dr. Rastogi would require for this a small amount of equipment and a few technical personnel, the financial aspect of which is given below:

	Total financial requirements. (in rupees)	Foreign Exchange. (in rupees)
1. *Staff*:	43,000	. .
2. *Equipment*:	27,000	25,000
3. *Contingencies*:	10,000	. .
Total:	80,000	25,000
Total of A & B:	20,05,000	3,25,000

9. *Development and Exploitation of Singrauli Coal.*

With the developmnt of industries in Uttar Pradesh, requirements of fuel and power will shoot up manifold. It is for this purpose that detailed investigations of Singrauli coal field to prove its reserves will be necessary. For such investigations it has been proposed to allot Rs. 10 crores. These investigations would be carried out by the Geological Survey of India and National Coal Development Corporation.

At this stage it would not be out of place to mention a few of the difficulties that are likely to be met in implementing these schemes. Firstly, there is definite shortage of qualified technical men. The expanding Central organisations where better facilities are available, attract people of higher calibre. It has, therefore, been proposed to offer higher starting salaries. Since it may not be possible to make available all the staff requirements during the first year, it was decided to split up the employment of personnel and purchase of equipment during the first two years on 80:20 ratio. Unless all the requirements of staff and equipment are completed within the first two years, targets aimed at would not be completed. Secondly, in order to effectively implement the schemes, foreign exchange for most of the equipment is required.

While concluding the report, it can be said that total finances to the tune of Rs. 79.32 lacs for development of mineral resources in Uttar Pradesh, and Rs. 10 crores for development of Singrauli coal-fields are needed in the Third Five Year Plan. There is hardly any need for explaining further the role of minerals in the industry, and the great need for geological work in this State, which so far has been very meagrely developed. With the development of minerals, will arise several metaliferrous and non-metaliferrous industries. The aim for greater industrialisation would go a long way in stabilizing the economy of our country. Mineralogically speaking, Uttar Pradesh is least developed, partly because it lacks in facilities like transportation and power, and largely because of no serious measures having been taken to utilise the minerals for industrial purpose.

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13. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'LEATHER & ALLIED INDUSTRIES.'

The Working Group on Leather & Allied Industries met on April 24, 1959 and discussed the industries that could be taken up for establishment in Uttar Pradesh, during the Third Five Year Plan. The Group decided for the establishment of the following units:

(I) *Tannery for Glace Kid:*—India is one of the largest producers of goatskins. About 225 lakhs goatskins are annually produced in the country. Uttar Pradesh alone produces about 53 lakhs of such skins.

(*a*) *Import:*—Some goatskins were imported in the country. The figures for 1957 and 1958 are as under:

Year	Qty. of goatskins imported	Value in Rupees
1957	7,728 cwt.	13,20,453/-
1958 (Jan.-Nov.)	7,795 cwt.	11,67,659/-

(*b*) *Export:*—The following quantities were exported from the country:—

Year	Qty. of gotskins exported	Value in Rupees
1957	2,29,503 cwt.	6,45,16,161/-
1958 (Jan.-Nov.)	2,03,017 cwt.	6,04,02,798/-

From the above, it will be seen that the country is exporting large quantities of goatskins. The import of goatskins was mostly from the neighbouring countries as they were available for cheap prices. The cost of imported skins was between Rs. 150/- to Rs. 175/- per cwt., while the cost of exported skins was between Rs. 280/- and Rs. 300/- per cwt.

No tanned goatskins were imported. The export of tanned goatskins was as under:—

Year	Qty. of goatskins exported	Value in Rupees
1957	96,553 cwt.	76,437,531/-
1958 (Jan.-Nov.)	80,853 cwt.	66,041,501/-

From the above, it will be seen that the export price of tanned goatskins is about Rs. 800/- per cwt., of course the number of tanned goatskins per cwt. is more than that of raw skins due to the moisture contents of the latter. However, the prices of tanned skins crust is about 40% more than that of raw. All these tanned skins exported were from Souht India in crust. If the skins were tanned and converted into Glace Kid and then exported the price obtained would have been more.

(*c*) *Consumption:*—The consumption of Glace Kid in the country is very limited. We will have to depend on the export to the western countries. In course of time the internal consumption may increase specially as the production of chrome leather from cow hides has decreased due to non-availability of good (raw) cow hides.

(d) *Raw materials available:*—About 53 lakhs of goatskins are available per annum in Uttar Pradesh alone, and hence the State ofiers an ideal condition as far as the supply of raw material is concerned. The goatskins available in the eastern parts of the State and in the adjoining State of Bihar are supposed to be very good for the manufacture of Glace Kid. Consequently the establishment of a tannery for the manufacture of Glace Kid in U. P. in collaboration with a foreign concern is considered necessary.

(*II*) *Factory for Glue, Edible Gelatine and Photographic Gelatine:*—Leather Industry is one of the major industries of Uttar Pradesh. It meets about 60% of the country's production of vegetable tanned leather. Flashing and trimings are available in large quantities which could be utilised for the production of glue etc. and hence establishment of a factory therefor is recommended.

(*III*) *Factory for shoe grindery:*—A large number of wrokers are engaged in the production of footwear at Agra and Kanpur. They are using miscellaneous items of grindery in the manufacture of footwear and to meet their demand, the establishment of a factory for the manufacture of shoe grindery in U. P. was considered necessary.

In view of the fact that 60% of vegetable tanned leather by the western methods and about 30% of chrome tanned leather of that produced in Union is being produced in U. P., the Group decided that the following new lines of production could be taken up by the existing units.

(1) Leather board.

(2) Hydraulic leather.

(3) Fancy leather.

(4) Upholstery leather.

Since the availability of raw hides is a limiting factor the Group thought that it would be too early for the present to draw plans for the fourth and subsequent Plan periods.

The second meeting of the Group was held on 15th September 1959 to finalise its recommedations.

The Group after considering the preliminary project reports recommends:—

1. That the project reports as prepared by the members and approved by the Group be forwarded to the Plan Committee for inclusion in the Plan for the establishment of the units during the Third Five Year Plan period.

2. That priorities for the establishment of units be fixed as under:—

		Estimated cost in Rupees.
(*i*)	Tannery for glace kid	60,00,000/-
(*ii*)	Factory for glue, edible-gelatines, photographic gelatine	14,00,000/-
(*iii*)	Factory for leather board	14,00,000/-
(*iv*)	Factory for hydraulic leather	24,00,000/-
(*v*)	Tannery for fancy leather	12,00,000/-
(*vi*)	Tannery for upholstery leather	5,50,000/-
(*vii*)	Factory for shoe grindery	15,00,000/-

3. That all these units should be established as far as possible in the private sector, if and when necessary with the help of some financial assistance from the Government. The Tannery for Glace Kid should be established in colloboration with some foreign concern of repute preferably from U.S.A., U.K., Germany or U.S.S.R. Foreign colloboration may be sought for other units also whenever necessary.

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सत्यमेव जयते

14. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'FOREST PRODUCTS.'

Introduction :—Uttar Pradesh has a total area of 15,649 sq. miles under forests, out of which 12,988 sq. miles are under the control of the Forest Department, and 2,661 sq. miles are civil and miscellaneous forests. Forests are the source of important raw materials for various industries; unfortunately even the State forests are not fully geared to provide the maximum quantity possible of various raw materials. This is because adequate resources have generally not been provided for the proper development of the forests. Comprehensive schemes have been drawn up for forest development during the III Five Year Plan, and it is expected that more and more raw materials will be available from the State forests during the Third and subsequent Five Year Plans for industries.

2. The production of important items in 1957-58 form the State forests was as follows:—

1.	Timber	1,50,89,000	Cu. Ft.
2.	Fuel	6,34,35,000	„ „
3.	Bamboo	1,44,39,000	Nos.
4.	Crude resin	2,95,700	Maunds

Timber is one of the most important industries of the State, being widely scattered in different districts. The State Forest Department supplied sleepers for the Indian Railways worth Rs. 80 Lakhs during 1958-59. Uttar Pradesh sends out appreciable quantities of timber to the States of Punjab, Rajasthan, Delhi, Bihar and Bengal. Uttar Pradesh also sends out plywood, matches, *Kattha* and a large number of medicinal herbs and other various types of forest produce to different States.

3. The important existing industries in Uttar Pradesh based on forest produce are as follows:—

(i) *Resin*:—Indian Turpentine and Rosin Company, Clutterbuckganj, Bareilly.

(ii) *Kattha*:—There are three factories viz., at Bareilly, Haldwani (District Nainital) and Najibabad (District Bijnor). The Bareilly factory is the oldest and biggest.

(iii) *Plywood*:—There is one big factory at Sitapur and there are two small factories, one each at Najibabad (district Bijnor) and Jwalapur (district Saharanpur).

(iv) *Matches*:—Western India Match Company, Clutterbuckganj, Bareilly.

(v) *Paper*:—Star Paper Mills, Saharanpur and Upper India Couper Paper Mills, Lucknow.

(vi) *Bobbin*:—At Clutterbuckganj, Bareilly. This is closed at present.

4. *Resin Industry*:—Resin is obtained by tapping trees of chir

or *pinus longi folia* of which we have vast areas throughout the Kumaon Civil Division. The yield of resin from the Uttar Pradesh forests in 1958-59 was 3,37,955 maunds. A special scheme has been drawn up by the Forest Department under the III Five Year Plan, and it is expected that this yield will be raised by two lakh maunds in the beginning of the III Five Year Plan. The present cost of rosin production in Kumaon Circle is about Rs. 13 per maund while in Tehri Circle it is about Rs. 15 per maund. The cost of additional production of rosin is likely to be about Rs. 19 per maund. Practically all the rosin produced is at present earmarked for the Indian Turpentine and Rosin Company at a rate slightly higher than the cost of productian. The market rate of rosin at present is Rs. 35 per maund. The basic factor in the increase of rosin production is the opening up of forest areas by new motor roads. The Indian Turpentine and Rosin Co. is executing a plan of expansion which is expected to be completed by March, 1960, and with this expansion the Indian Turpentine and Rosin Co. will be able to consume the entire production of resin of the Uttar Pradesh Forest Department. Rosin tapping provides employment to a very large number of people in the hills, and is vital part of the economy of these regions.

5. The crude rosin on distillation gives about 75% of rosin and 18% of turpentine. There is a good demand for rosin in the paper industry, and of turpentine for paints and varnishes in the country, which is growing rapidly. There is also scope for export of these products to other countries. It is estimated that the export of the products of one lakh maunds of rosin will bring Rs. 30 to 40 lakhs foreign exchange per annum. There is also considerable scope for the manufacture of various other products from turpentine like insecticides and other solvents which the country is at present importing.

6. *Kattha:*—*Kattha* is produced from the heart-wood of Khair trees (*Acacia catachu*) by boiling the chips of heart-wood in water. The present yield of *Khair* trees in Uttar Pradesh is about 42,000 trees of 12 inches and over diameter (at breast height) annually, mainly in western circle and to a smaller scale in eastern circle. Some *Khair* trees also occur in the southern circle but they are not usually of more than 6 inches diameter. *Kattha* is manufactured by the modern factory method as well as by the cottage industry method, the latter by certain people specially *Chais,* who specialise in its manufacture by the indigenous method.

7. At present there are 3 *Kattha* factories, one each at Izatnagar (Bareilly), Haldwani and Najibabad. The Indian Wood Products, Bareilly, is in existence for the past 39 years and is an old factory manufacturing *Kattha* and *cutch* and 16,000 trees of *Khair* are supplied annually to this firm, so far on long term lease which is now due to expire shortly. The Haldwani factory is about 2 years old and the Najibabad factory has strated production only in 1959. In the factory method apart from main produce *Kattha,* we also get *cutch* which is used for dyeing purposes and also has an export market. As the cottage industry provides employment to a large number of people, it is not proposed to open any more modern *Kattha* factories although it is proposed that steps should be taken to improve the local method of producing *Kattha* on the lines already indicated by the Forest Research Institute, Dehradun which will also enable the *cutch* to be recovered by the cottage industry methods.

8. *Plywood:*—In May, 1952 the Development Wing of the Ministry of Commerce and Industry, Government of India estimated the annual capacity of the 57 approved factories in India on their list at 160.29 million sq. ft. At the beginning of 1953 some factories were

brought on the approved list and the capacity of the factories was re-assessed. This resulted in the annual rated capacity of the 70 factories on the approved list being estimated at 144 million sq. ft. In 1956 according to the Government of India Planning Commission's report—programme of Development 1956-61, the number of factories on the approved list was 64 and the rated capacity was 150.578 million sq. ft. Out of this there is only one factory in U.P. namely Plywood Products at Sitapur with annual rated capacity of 5 million sq. ft.

9. In addition there are 2 small factories, one at Najibabad and the other at Jwalapur, which are not included in the approved list of the Government of India. The Plywood Products, Sitapur is using *Kanju, Tun* and mango timber produced in Uttar Pradesh, and is supplementing its requirements of raw material by importing small quantities of some timbers from other States.

10. Details of raw material used in Plywood Products, Sitapur are given in table A annexed. The present production of this factory is about 60% of the rated capacity. The factory has also now set up a new particle board plant with an annual capacity of 5 million sq. ft.

11. The other two factories are using species like *Kanju, Kharpat, Godala, Chilka, Dalchak, Durki, Gutel, Borang, Pula* and *Patta*. Most of these species are of inferior quality and are used for fire-wood at present. Annual requirement of these factories for the species is about 5,000 trees.

12. In addition to the species suitable for plywood manufacture that occur in the plains appreciable quantities of *maples, birch and alder,* and small quantities of *walnut* exist in Tehri-Garhwal Circle, which are expected to be available during the Third Five Year Plan period when the forest areas are opened up by more roads.

13. It is proposed that the existing factories should be expanded and worked to their maximum capacity during the III Five Year Plan period.

14. *Match Industry:*—At present there is a large scale match factory (W. I. M. Co.) at Bareilly, which produced matches worth Rs. 1.10 crorers in 1955 and the annual production in 1958 was 96,147 cases containing 7,200 boxes each. This factory utilises practically all the *Semal* and *Gutel* timber that is available in Uttar Pradesh and is ear-marked by the Government for this purpose. The number of trees allotted to W. I. M. Co. in the years 1954-55 to 1956-57 by the Forest Department is given below:—

Year	Semal	Gutel
1954-55	4,896	2,121
1955-56	4,836	1,700
1956-57	3,875	1,916

The raw material available from Uttar Pradesh forests is hardly sufficient to meet about 33% of the factory's total annual requirements, and consequently they have to import raw materials from Nepal, Punjab, etc. The raw materials used by W. I. M. Co. during the last 5 years are given in table B annexed.

15. There are no proposals for the extension of the present capacity of the factory, due to shortage of the raw material, but large scale plantation of matchwoods is now being contemplated to provide adequate raw material in future.

16. *Bobbins*:—A Bobbin Factory was established at Clutterbuckganj by the Uttar Pradesh Government under the Forest Department in 1919 to meet the demand of the textile industry, as a serious shortage of bobbins had been experienced during the first world war. It was subsequently transferred to the management of a syndicate in 1923 and the Indian Bobbin Co., Ltd. was formed in 1924. From 1924 to 1950, it was managed by the managing agents. The management was formally taken over by the U. P. Government in 1950.

17. During the second world war there was a good demand for bobbins and substantial profits were made, but subsequently the demand slackened, on account of import of foreign timbers which were somewhat superior to the indigenous timbers, *viz., Haldu* and *Phaldu* from which the bobbins were made at the factory, imported bobbins and setting up of a number of factories in various parts of the country near the textile mills which on account of their more favourable location were able to market their goods more easily than the Indian Bobbin Factory at Clutterbuckganj.

18. The Bobbin Factory was damaged by fire which led to severe restriction of production. A new set of 14 bobbin machines driven by A. C. motors was, however, purchased in 1952 which has since been lying idle. The factory was closed in December, 1953 on account of heavy losses due mainly to the increase in price of the *Haldu* and *Phaldu* trees, the decline of bobbin prices after the war and the expensive power plant. On account of restrictions imposed by the Government of India on the import of bobbins and timber suitable for manufacturing bobbins, there appears to be a greater prospect now for indigenous bobbins. It is also proposed to move Government of India to impose more restrictions on the import of bobbins.

19. The outturn of *Haldu* from the Uttar Pradesh forests during 1957-58 was 1,61,000 cu. ft. We have appreciable quantities of *birch* and other species in the Tehri Circle. It is therefore, proposed to re-start the bobbin factory during the Third Five Year Plan period.

20. *Hardwood*:—Uttar Pradesh has about 20,000 tons of *salai* available in Mirzapur district in the Rihand Dam area and in Varanasi district annually. This wood is practically not used at all so far and its production can be increased in due course. Apart from *salai* other woods like *jhingna*, etc. are also available in this zone. Hardboards are widely used in building and construction industries for false ceiling, partition, panelling and air conditioning. In passenger railway coaches and buses they are employed for interior panels and in furniture and packaging industries their use is rapidly developing. Import of hardboards during 1957 and 1958 was 3,725 tons valued at Rs. 29.20 lakhs and 1,580 tons valued at Rs. 11.16 lakhs respectively. Import licences issued up to September, 1957 were 10% of previous quota and thereafter imports were completely banned. On this basis the present annual requirement of hardboards in the country can be roughly estimated at 25,000 to 30,000 tons. Three firms *viz.*, Anil Hardboards, Bombay, Madhya Pradesh Industries Limited, Bhopal, and Western India Plywood Ltd., Baliapatam, have already been licensed by the Government of India under the Industries (Development and Regulation) Act for the production of 6000, 6000 and 3,750 tons of hardboards per annum respectively. Anil Hardboards started production some months back.

21. It is, therefore, proposed to establish two hardboard factories, one in Mirzapur zone based on *salai* wood and other miscellaneous woods, and other at Kotdwara. Bareilly also needs to be considered as an alternative site.

22. *Pencil Manufacture:*—India is still importing a very large quantity of pencil slates for the manufacture of pencils. Uttar Pradesh has large quantities of timbers available, which are suitable for the manufacture of pencils. It is proposed that pencil manufacturing units may be set up at Dehradun, Ramnagar (Nainital), Bareilly and Mirzapur. However, this will be in small scale sector.

23. *Medicinal Herbs and Drugs:*—A large number of medicinal herbs and drugs are found in the State forests, with its vast variations of climate. It is proposed to cultivate the important herbs and drugs systematically at a cost of Rs. 28 lakhs during the Third Plan period.

24. *Paper, News-print and Rayon:*—By far the most important new industries that are proposed to be set up during the III Five Year Plan based on forest products are the manufacture of writing and printing paper, news-print and rayon. These are being discussed under the Paper and Pulp Group.

25. During the Fourth and Fifth Five Year Plans, it is expected that large quantities of soft wood the plantation of which is being raised now, will be available. As such it will be possible to set up more industries of rayon, pulp and plywood in the Fourth and Fifth Plan periods.

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TABLE 'A'

Showing details of raw materials used in Plywood Products, Sitapur
(in cubic feet)

	1954-55	1955-56	1956-57	1957-58	1958-59	Remarks
Teak	10,176	14,000	14,764	10,704	11,831	Madhya Pradesh.
Kanju	1,28,125	1,79,712	1,80,076	1,85,647	2,15,647	Uttar Pradesh.
Rosewood ..	140	175	210	174	474	Madhya Pradesh.
Walnut	..	..	..	..	579	Kashmir.
Mango	..	..	13,991	25,942	18,873	Uttar Pradesh..
Mango Planks	..	..	7,885	14,206	16834	Uttar Pradesh..
Hellong	..	..	..	..	2,655	Assam.
Amar ..	..	..	..	..	561	Uttar Pradesh.
Toon ..	..	..	..	..	224	Uttar Pradesh

TABLE 'B'

Showing details of raw materials used by the Western India Match Company during last five years (in cubic feet).

Raw material (Timber)	1954	1955	1956	1957	1958
Semal from U. P. and Nepal	4,83,152	4,24,036	4,58,855	4,73,672	5,84,131
Semal from Kangra Valley	2,198	9,621	4,051	2,644	..
Gutel from U. P. ..	40,075	37,973	81,821	43,493	30,370
Total ..	5,25,425	4,71,630	5,44,727	5,19,809	6,14,501

15. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'SUGAR INDUSTRY'.

The Working Group on Sugar Industry was required to consider proposals for inclusion in the III Five Year Plan in relation to the future development of Sugar Industry in the State.

It need hardly be emphasised that Sugar Industry is the top ranking industry of the State and has an important bearing on the economy of the State and the producers of sugarcane. The State has hitherto maintained a leading position in the country in sugar production. Lately the Sugar Industry has made some progress in the southern part of the country and it is apprehended that Sugar Industry of Uttar Pradesh might have to face competition unless positive steps are taken to strengthen it by raising its working standards and making them reasonably comparable to those obtaining in the sugar factories of South India The problem is of far reaching consequence connected as it is with the agro-economy of the State.

The Working Group considered the problems of the Sugar Industry of the State, in all its perspectives. As the problems connected with the Industry are of diverse and technical nature, it was felt necessary to divide them in suitable groups. With a view to rendering elaborate consideration of each group of problems, sub-groups of the Working Group were appointed to examine them and to submit their recommendations to the Working Group for final consideration and onward transmission to the Heavy Industries Plan Committee. Accordingly, three sub-groups were formed. The points that each of these sub-groups had to consider are enumerated below:

Sub-group I—

(*a*) To consider proposals regarding increase in yield and quality of sugarcane in Uttar Pradesh.

(*b*) To consider the proposal for reduction of area for intensive development of cane cultivation and of progressive reduction in area under sugarcane.

(*c*) To consider about long term rezoning of cane areas of the sugar factories in U. P. so that factories may take greater interest in development of their areas.

(*d*) To consider about a plan for utilising the power from sugar factories for general agricultural development or other industrial purposes during the period they are lying idle.

Sub-group II—

(*a*) To consider installation of additional capacity in the Third Five Year Plan either by expansion or by setting up of new units.

(*b*) To draw out requirements of various items of sugar machinery and parts, generally required by the various sugar factories and to suggest ways and means for obtaining them.

(*c*) To consider about expansion of small units, shifting of factories and rejuvenation of old and idle plants.

Sub-group III—

To draw out a scheme for utilising excess bagasse available from sugar factories in the development of by-products industries, and molasses for fermentation industries.

The problems investigated by each of the three sub-groups and the observations made by them are given below along with the final recommendations of the Working Group thereon.

Sub-group I:—This sub-group was formed with the object of considering the problems pertaining to the development of sugarcane cultivation in the State and to suggest ways and means for raising the yield per acre. The sub-group considered the 'draft III Five Year Plan' originally prepared by the Cane Department for intensification and development of sugarcane cultivation in the State. The main objective of the plans completed during First Five Year Plan and the Second Five Year Plan under operation has been to raise the average yield per acre of cane and to feed the sugar factories from as compact an area around them as possible. The suggestions of this sub-group as also the sub-group on Cane of the Working Group on Agriculture, which was associated with a view to having co-ordinated thinking and planning the activities for the development of sugarcane in the State, were considered by the main Group.

The important recommendations made by the sub-group and the modifications suggested by the Working Group are briefly summarised below itemwise—

Items (*a*) *and* (*b*)—

1. *Irrigation*:—The joint group was of the view that the proposed number of masonry wells, bored and fitted with persian wheels was too large and that of tubewells much less. Their proportion should be modified.

The group was of the opinion that funds for the purpose should be provided in the Cane Development budget and execution of work should be the entire responsibility of the Ganna Ayukt for which necessary staff should be employed.

The Working Group on Sugar Industry considered the above recommendations made by the sub-group and accepted them. It was, however, observed that the eastern tracts in the matter of allotment of State irrigation facilities have been neglected merely on the ground that the provision made did not prove to be so productive as in the western and central tracts. It was thought that adequate provision in this direction should be made keeping aside the idea of economic return until a certain accepted standard had been achieved.

2. *Manure*:—Subsidy should be allowed on fertilisers and *sanai* seed particularly for eastern districts of the State. The Working Group considered this recommendation and decided that subsidy on manures should be dropped in view of the fact that no such provision exists in

respect of other important food crops in the Agriculture or Planning Departments.

3. *Cane Protection:*—The provision under this head should be increased to Rs. 1 crore. The recommendation was unanimously adopted by the Working Group.

4. *Training of Personnel:*—Programme for training should be more intensive. There should be 3 phase training—

(*a*) *Pre-Service Training:*—After selection the staff should be given atleast six months' practical training at the close of which an examination should be held and appointment should be offered to only successful candidates.

Provision for paying some stipend to the trainees during pre-service training should be included in the Plan proposals.

(*b*) *Service Training:*—After the candidates have been appointed and have gained some experience they should be given two months' intensive training in the working of the department and its broad policies.

(c) *Refresher Courses:*—These should be held periodically throughout the service period of the staff.

Further the group strongly recommended that the staff of the Cane Department should be offered opportunities of training and on-the-spot studies abroad under various foreign assistance programmes and Government scholarships. Study tours to other States of the country should also be organised. The tours sponsored by the National Productivity Council on Sugar Industry should include the members of Cane Development Department.

The recommendations of the joint sub-group with regard to extensive and intensive training were accepted by the Working Group. So far as study tours to other States in the country were concerned, it was suggested that proposals should include such schemes under which selected staff of the Cane Department and also some growers, if they felt interested, could be attached to commercial farms on a long term basis so that they could imbibe actual practices and in fact the spirit and enthusiasm which the growers in those States possessed.

5. *Statistical Organisation:*—This wing of the Department should be strengthened. The existing 1400 or 1500 crop cutting experiments should be considerably augmented so that variations of soils , climate, rainfall, geographical position etc. are fully accounted for and reliable data is available for each cane zone under varying conditions. The above proposals were unanimously accepted by the Working Group.

6. *Publicity and propaganda:*—The joint group while fully appreciating the necessity for this technical and development organisation felt that the allotment therefor should be slightly reduced. The Working Group for Sugar Industry placed this figure at Rs. 30 lacs in place of Rs. 57.13 lacs originally proposed.

7. *Communications:*—The provision for construction of 500 miles of painted roads and C. C. tracks was considered too low. The joint group recommended raising this target to atleast 1000 miles. For the implementation of the programme the usual contributory basis should be adopted. The beneficiaries *i.e.* the factories and cane growers should contribute 1 n.p. per maund of cane. This would amount to collection of

about Rs. 2.5 crores as local contribution. The remaining 2/3rd, that is Rs. 5 crores should come from the Central and State Governments at 50 per cent each.

The experience of the 1st and 2nd Five Year Plans showed that the progress of road construction was very slow because there was no administrative control of the Cane Commissioner on the execution of the programme. The joint group strongly recommended that provision should be made in the budget of the Cane Department and the Cane Commissioner should be made responsible for execution of the works with the help of the technical staff to be provided by the P. W. D.

The recommendations of the joint sub-group were accepted. The Working Group suggested that the contributions from the cane growers should be made on voluntary basis to be supplemented by the factories with equal contribution for improvement of communications.

The Working Group was in complete accord with the suggestions that the work should be executed under the administrative supervision of the Cane Commissioner. It, however, suggested that arrangements in this regard may have to be discussed with the P. W. D. before any final pattern could be decided upon.

Item (c)

The joint sub-group went into details of zoning system. The existing law provided year to year reservation and assignment of areas for individual factories. The reluctance on the part of industrialists to invest funds in development works, was largely due to uncertainty in the matter of assignment of the areas so developed. If factory owners were required to spend money on sugarcane development, they will have to be assured at the same time of the benefits accruing to them from such investments and this called for some sort of permanent re-zoning of cane areas.

The joint sub-group recommended that in allocation of areas, the principle that specific areas developed by a factory from its own resources would as far as possible be assigned to the same factory, should be adhered to. In the case of a factory having incurred any expenditure in expanding its capacity, normally additional area should not be allocated to it, but it should be persuaded to develop the potential of the existing area.

The long term basis of reservation should among other things be formulated on the following considerations:—

(1) That keeping in view crop rotations and other factors sufficient culturable area was made available to a factory for drawing its full feed.

(2) That as far as possible only contiguous and compact areas situated close to the factory should be allocated to it.

(3) That it would be desirable to re-allocate pockets which belonged to a certain factory, but were so situated that the area of another factory had to be transgressed for finding access to it.

(4) That in cases of rail-borne cane, cross haulage was to be avoided.

(5) That if two or more factories claiming a common area seek to

resolve their differences through mutually acceptable adjudication or arbitration, such agreements or settlements should as far as possible, be honoured on long term basis.

(6) That in cases where the culturable area fell short of the need and there were some difficulties in adding more to it, they should be given preference for implementing intensive development programmes as compared to those where cane was abundant on the basis of larger reserved areas.

The recommendations made by the joint sub-group were accepted by the Working Group on Sugar Industry.

Item (d)

The joint sub-group did not find any enthusiastic and encouraging response on the part of the sugar factories to make spare power available during off-season for running tube wells. The difficulties of laying transmission lines, involving high costs, were no doubt considered but these could somehow or the other be solved by persuading the Irrigation Department to purchase power from the factories and sell it to growers. Only 5 factories of eastern U. P. have so far offered to make their spare power available.

However, for the present no definite recommendations could be made in this behalf.

The Working Group decided to drop this item as it was not considered feasible to energise a few tube-wells constructed through the Cane Department.

Sub-group II:—This sub-group was to consider the projects that were to be included in the III Five Year Plan for stepping up the sugar production in the State so that the increasing consumption of sugar in the country owing to change of habits of the people, export requirements, creation of buffer stocks, etc. could be met. The important observations and recommendations made by this sub-group are summarised below:—

Item 1:—The target for sugar production during the Third Five Year Plan for the country as a whole is put at 32 lakh tons and the share of the State of Uttar Pradesh, on the basis of target for the season 1958-59 ought to be at least 15 lakh tons. It was felt that the existing crushing capacity of the mills was inadequate and if at all the target of 15 lakh tons had to be achieved, the following schemes must be introduced in the III Five Year Plan.

(1) Erection of new sugar factories.

(2) Expansion of the existing units.

(3) Shifting of the sugar factories to more suitable areas from their existing congested locations.

The important observations made by the Working Group on the recommendations of the sub-group are enumerated below—

1. *Erection of new sugar factories*:—A proposal was made by the sub-group that 5 new sugar factories may be secured for the State out of the total number that the Government of India might fix up for the III Five Year Plan. This number was, however, subsequently raised to six in view of the instructions received from the Convener of the Heavy Industries Plan Committee. As regards the location of factories it was

thought by the sub-group that since a High Power Committee to decide this issue was already in existence, the question need not be taken up here. The Working Group, however, felt that tentative locations should at least be suggested, by indicating the districts where possibilities to set up sugar factories existed. A list was accordingly drawn up and given in the Proforma 'X' on the basis of requests received from different districts for setting up new units. The details with regard to size of the plants, total cost, foreign exchange requirements, power requirements, employment potential etc., have been given in the Nucleus Report and hence the same are not being repeated here. The total crushing capacity of these new units is expected to be 6000 tons per day which would be capable of producing 0.8 lac ton of additional sugar annually. The total cost of this project is estimated at Rs. 8.5 crores.

2. *Expansion of existing sugar factories:*—The sub-group had proposed that expansion may have to be envisaged in about 20 sugar factories with a view to achieving a total additional capacity of 10,000 tons per day. The Working Group on Sugar Industry considered this figure to be low and increased it to 16,000 tons per day. This change had to be made in view of the fact that the sub-group had based its recommendations on a rather higher assumption of average duration, *viz.*, 150 days with average recovery of 10%. It was thought that an average duration of 140 days could be maintained by the sugar factories when special care was taken by them about off-season repairs to prevent frequent breakdowns, etc. The total number of units in which the expansion would have to be granted was put at 30. The total cost of this project is estimated to be Rs. 12 crores.

3. *Shifting of sugar factories from cognested areas to more suitable areas:*—The recommendations made by the sub-group were accepted by the Working Group and it was agreed that certain sugar factories located in districts of Deoria, Rampur, Gonda and Basti, suffered badly from shortage of cane supplies and it was necessary to shift them to areas where either more cane was available and could not be properly utilised or where cane cultivation could be appropriately developed.

Item 2:—The recommendation of the sub-group that proposals for setting up of the Industry for manufacturing spare parts and machinery for sugar factories be taken up by the Working Group No. X on Mechanical Engineering was accepted. It was, however, suggested that the sites for the location of the units be chosen from among Allahabad, Bareilly and Kanpur.

Sub-group III:—The question with regard to the utilisation of excess quantity of bagasse and molasses available with the sugar factories was considered by this sub-group and the recommendations made by it are summarised below:—

(1) *Utilisation of Bagasse:*—Uttar Pradesh produces about 0.9 million tons of air dry bagasse, most of which at present is used as a fuel in the sugar factories. This bagasse can serve as a potential raw material for the manufacture of newsprint and other varieties of paper.

The requirement of bagasse for a 150-ton newsprint factory (containing 60% bagasse chemical pulp) will be about 72000 tons per annum which can be obtained easily from couple of big sugar factories if the entire quantity of the bagasse is requisitioned and coal is substituted as fuel. In case the proportion of bagasse chemical pulp is reduced to half by substituting grass chemical pulp, the requirement of bagasse will decrease to only 36000 tons which can be obtained from a few factories as surplus bagasse or only from one factory as substituted bagasse.

Taking into consideration the availability of bagasse, facilities of transport, water etc., Gorakhpur was suggested to be the most suitable location for establishing a newsprint or paper factory in the Eastern U.P. and Saharanpur or Muzaffarnagar in the Western U. P. Golagokarnnath and Hargon may also be suitable for establishing paper factories.

(2) *Utilisation of Molasses*:—The average annual production of molasses in Uttar Pradesh during the past few years has been in the region of 4,00,000 tons which is expected to have risen to about 422,000 tons by the end of 1959. These molasses contain 44-54% sugar and most of this material is at present used for manufacture of alcohol; only small quantities being diverted for utilisation in tobacco manufacture and in foundries. By the end of 1959 it is presumed that the total installed capacity of our distilleries will have reached a figure of 20 million gallons per year for which the quantity of molasses required will be in the region of 4,00,000 tons, thus leaving an excess of about 22000 tons.

These surplus molasses could serve as a potential raw material for other fermentation industries for manufacture of items like citric acid, lactic acid, acetic acid, butyl alcohol, acetone etc. But certain limitations of the Indian molasses delimit their utilisation in a number of fermentations, unless further work is done about them. As such only two industries viz., acetic acid and citric acid have been suggested during the III Plan period. Recently a new process has been developed by a German firm for the manufacture of acetic acid direct from fermentation of molasses. This process can be adopted in U.P., particularly in those places where a local accumulation of molasses takes place.

It was suggested that three plants for manufacturing of acetic acid by the above mentioned process should be set up in U.P. (perferabaly at Basti, Deoria and Muzaffarnagar) each of a capacity of 1000 tons per year. These units will consume about 12000 tons of molasses per year.

It was also suggested that two units for the manufacture of citric acid, each of a capacity of 1000 tons per year, may be set up in U. P., preferably in Deoria and Barabanki districts. These units will consume about 10,000 tons of molasses.

The Working Group agreed with the recommendations made by the sub-group. Nucleus reports in respect of utilisation of bagasse and molasses have been prepared by the Working Groups for 'Paper and Pulp' and 'Fermentation Industries' respectively.

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16. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'TEXTILE INDUSTRY'.

Introduction:—The vital part played by the textile industry in building up and maintaining the economic prosperity of the country calls for wider introduction of better and improved techniques and processes. As the rise and fall in the fortunes of this vital industry had its reactions on the other aspects of the industrial development in the country, it could very well be considered the barometer of the country's industrial progress.

(1) *Cotton Textile Industry*:—The Indian Cotton Textile Industry has 482 units comprising 294 composite units, and 188 purely spinning units with a total equipment of 13.05 million spindles and 2,00,000 looms. For the assessment of growth of textile industry, number of spindles may appear to be a valid criterion as cotton yarn forms the basic raw material for weaving of cloth in all the sectors, *i.e.*, mill, powerloom and handloom sectors of the Cotton Textile Industry. During the last 10 years, i.e. from 1949 to 1958 the increase in spindlage growth was roughly by 26% (respective figures for 1949 being 10.3 million spindles and for 1958, 13.05 million spindles).

In the II Plan period, it was envisaged to have a total production of 8,400 million yards of cloth. This over-all target of production of 8,400 million yards includes 1,000 million yards earmarked for export. According to the revised *per capita* consumption (17.5 yards instead of 18.5 yards) by the end of 1960-61, the annual requirements work out to 8,000 million yards, which include 1,000 million yards for export purposes. In other words, the requirement for civil consumption at the end of the II Five Year Plan i.e. by 1960-61, would be 7,000 million yards. During 1958, the industry in all its three sectors delivered 670 million yards of cloth for export purposes, thereby leaving 6,330 million yards available for civil consumption. Statewise export dependence factor is very low with the U. P. Mills. The detailed statistical position is given below showing the export dependence factor *Export/Production* × 100 for the year 1958.

Figures in million yards.

	Export Deliveries.	Production.	$\frac{\text{Export}}{\text{Production.}} \times 100$
Bihar ..	0.19	4.86	3.90
Andhra ..	10.76	33.10	32.50
Ahmedabad City ..	74.28	1,146.47	6.48
Bombay City ..	309.49	1,497.82	20.66
Bombay Rest. ..	111.44	669.36	16.65
Kerala ..	1.99	20.84	9.55
M. P.	53.58	413.85	12.94

Madras	14.91	121.26	12.29
Mysore	5.44	79.98	6.80
Orissa	0.53	32.41	1.63
Punjab	0.08	60.11	0.13
Rajasthan	..	53.66	
U. P.	23.11	328.21	7.04
West Bengal	4.65	268.97	1.72
Delhi	10.31	162.53	6.34
Pondicherry	14.63	33.52	43.64

The *per capita* availability of cloth in the recent past has been as under:—

1952	14.4 Yards.
1953	15.2 Yards.
1954	15.2 Yards.
1955	16.1 Yards.
1956	16.6 Yards.
1957	15.5 Yards.
1958	16.7 Yards.

The Textile Enquiry Committee set up in the month of June 1958, have assessed that by the end of II Plan period, the *per capita* consumption will amount to 17.5 yards. The Indian Cotton Mills Federation in a recent Memorandum furnished to the Planning Commission, evaluated that in 1966 for a population of 434 millions, the requirements of cotton cloth *per capita* for domestic consumption at 20.3 yards will amount to 8,810 million yards. Putting estimated exports at 800 million yards, the total requirements will amount to 9,600 million yards. Assuming, therefore, that the targets for the additional requirements will be on the same basis as for Second Plan period, the mill sector will be required to produce 6,300 million yards by the end of III Five Year Plan.

The total spindles and looms installed in the country as on January 1, 1959 were 28,07,666 in purely spinning mills and 1,05,98,800 in composite mills having 2,01,063 installed looms. The percentage of installed capacity of spindles and looms working in U. P. is 4.87 and 5.73 respectively. U. P. being a deficit State in regard to textiles, proper development of its existing textile units (both closed and running ones) during the III Five Year Plan and successive IV and V Five Year Plans in line with the All India policy seems very necessary.

The Working Group on Textile Industry in U. P. after collecting necessary information and after detailed discussions, came to the conclusion that during the III Five Year Plan period, there is definitely a need for considering, on priority basis, the needs of the Cotton Textile Industry, which is one of the major industries of the State. There were 17 composite textile mills, 10 spinning mills and 3 weaving mills at the end of 1958. The numbers of spindles and looms installed were 8,75,064 and 13,278 respectively on January 1, 1959. The daily number of workers employed totalled to about 63,000. Scrutiny of the balance sheets of some of the mills revealed a continuous fall in their economic stability. It has been found that liquid resources in the case of most of the mills have almost disappeared, fixed assets have been mortgaged, and the textile industry of the State is starving without essential supply and funds even for payment of wages.

It was decided that the items noted below be taken up during the III Plan:—

I. Reopening of Closed Units and Rehabilitation of Uneconomic Units:—The question of closed units, mostly ex-Kanpur mills, and Cawnpore Cotton Mills, was discussed and the Working Group held the view that a case for re-opening of the closed units and putting them on modern lines of production does exist. The Working Group, however, concluded that in the first instance idle spindles and loomage should be offered to the existing managements, who will get necessary assistance from the State Government provided specific projects are submitted for examination of each case on merits. In case the existing managements fail to come forward and shoulder the responsibility, the idle spindilage and loomage be offered for establishment in the State to other industrialists on the same terms.

It has been estimated that the re-opening of the closed units and rehabilitation of uneconomic units will require in aggregate finances to the tune of 15.75 crores to 16 crores of rupees. An attempt has been made to evaluate the need of the closed units and other uneconomic units working intermittently in a tabular form in Proforma 'X'. The requirements worked out are tentative and susceptible to changes on further details being worked out when positive steps are taken to implement the suggestions of the Working Group.

II. Establishment of a Spinning Mill for Manufacture of Super Fine Yarn:—From the pattern of yarn production during 1958, it is found that there has been an upward shift in the average count of yarn spun in previous years. This upward trend in the average counts of yarn has been noticed both in case of composite mills and spinning mills, but more markedly in the case of the spinning mills. It is expected that the above trend in the pattern of yarn production may continue, as the choice of consumers is reported to be shifting from coarse to that of fine and superfine.

Besides, the above cotton yarn is the basic raw material for weaving of cloth in all the sectors, *i.e.*, mill, powerloom and handloom sectors of the Cotton Textile Industry U. P.'s need thereof, fo rits handloom industry and small powerloom units of superfine and fine yarn, which is being imported from other States particularly South India in sizable quantities each year, was broadly discussed by the Working Group and it came to the conclusion that if proper development of the handloom industry was to be achieved, the supply of fine and superfine yarn shall have to be ensured.

It was in this context, and in the context of the yarn production by mills in U.P., in various count groups (detailed in the tables below) that the Working Group concluded that there did exist a necessity for installation of a new unit of 25,000 spindles initially with provision for further expansion during IV and V Five Year Plans with location at either (i) Mau, (ii) Shahganj or (iii) Jhansi.

SPINDLES INSTALLED AND SPINDLE POINT PRODUCTION OF YARN DURING THE YEAR 1958.

PART I

	Spindles (Rings & Mules)		Yarn produced (Thousand lbs.)
	Spinning Mills.	Composite Mills.	
U. P.	90,672	7,52,026	11,452
Rest of States	27,16,994	98,46,774	1,29,329

PART II

	Composite Mills					Spinning Mills				
	1s—10s	11s—20s	21s—30s	31s—40s	Over 40s	1s—10s	11s—20s	21s—30s	31s—40s	Over 40s
Production in thousand lbs·	2,120	4,341	3,831	394	11	308	124	23	..	..
Percentage	20.5	40.5	31.5	3	06	2.62	1.5	0.32	..	..

III. Installation of Automatic Looms:—The installation of the latest and most efficient machinery has been found to be the only means of economic survival in the changing conditions of the present day world. To meet the new situation radical developments have been constantly taking place in the whole gamut of textile manufacture from blow room to finishing machinery. A beginning for the introduction of automatic looms for replacement of out-moded and obsolete machinery, has already been made by the Government of India during the current Plan period by permitting replacement of 2,500 looms during each of the years 1959-60 and 1960-61 and balancing of units by permitting installation of 3,000 automatic looms for purely export purposes.

The following table will indicate the percentage of the industrial capacity of the textile industry in the country:—

Where situated.	Percentage of spindles to total capacity of the country.	Percentage of looms to total capacity of the.country.
Bombay City & Island	24.92	31.42
Rest of Bombay State	10.36	11.46
Ahmedabad	16.26	19.80
Madras	19.36	4.60
West Bengal	4.80	5.34
Madhya Bharat & Bhopal	3.65	5.40
Madhya Pradesh	3.16	3.65
Total Mills in U.P.	6.56	6.59
Total Mills Working in U.P.	4.87	5.73
Kanpur	4.23	5.04

The Working Group in consideration of the pressing problem for replacement of plain looms with automatic looms, after detailed discussion, came to the conclusion that there was a dire necessity for the phased changeover in U.P. mills from plain looms to automatic looms on a special footing. It was, therefore, unanimously agreed that a target for replacement of 10,000 looms on a phased programme during the III Five Year Plan (constituting 50% of installed loomage and 100% of new loomage to be installed in place of looms in closed mills) should be fixed.

The change-over from plain looms to automatic looms is inter-linked with the question of displacement of labour which will have to be given a closer attention if the change-over is to be achieved smoothly. The displacement of skilled labour will have to be solved and the following remedial measures may be found useful.

1. Fixing of age limits for retirement.
2. Working on Sundays.
3. Absorption of labour in some of the closed units which might be restarted.
4. Absorption of surplus labour in some of the new units which might be opened.

A tentative scheme has been prepared for the change-over from plain looms to automatic looms detailing all the information required.

(2) *Art Silk Weaving Industry*:

ESTABLISHMENT OF A WEAVING MILL FOR ACETATE AND UNION FABRICS

The production of rayon fabrics during recent years is indicated in the table below:—

Year	Quantity (Million Yds.)	No. of looms reported.
1953	177.7	26,676
1954	179.9	25,965
1955	237.7	34,544

As the present weaving capacity is in-sufficient to meet the consumers' demand, which is rapidly growing, it is advisable to develop art silk weaving industry in U.P., particularly after the establishment of a Rayon Spinning Factory. After a detailed discussion of the various aspects, it was finally decided that two units of economic size, one at Tanda and the other in Varanasi may be established in the III Five Year Plan in the private sector.

(3) *Processing and Finishing of Cotton Textiles*:—In the last several years, cotton cloth processing and printing has made remarkable progress. The world's cultural life having made an endless advance, a tendency for newer and more attractive designs seems to be growing. In the clothing sphere also, natural fibre has given part of its place to man made fibre, which even has begun to be replaced by a new comer, poly mercerisation of cotton cloth which may well be called man-modified fibre making the human life richer and beautiful.

INTRODUCTLON OF SCREEN & FLOCK PRINTING AND ESTABLISHMENT OF SINGEING AND MERCERISATION UNIT IN U. P.

In U. P. we have a well organised hand printing industry, located in Farrukhabad, Mathura and Tanda (Faizabad), where common method of block printing is in vogue. Besides hand printing industry, there are about 2½ lakh handlooms working in different parts of the State giving employment to a vast number of people. In view of the general preference shown by the consumers towards finish and texture of cloth, the Working Group after a prolonged discussion decided that there is need for ensuring mechanised processing and printing of handloom cloth if they have to find a ready market in foreign countries. The Working Group, therefore, decided that initially in the IIIrd Five Year Plan, three such units should be put up in places where hand-loom industry is mostly established and to expand it further in the IV and V Five Year Plans.

However, since the units concerned belong to the small scale sector, it was decided that the projects may better be taken up by that sector.

(4) *Manufacture of Textile Machinery for Spinning Weaving and Processing*:—The Government of India during the II Five Year Plan accepted the need in principle for expanding the production of textile machinery in India equated to a production of cloth @ 20 yards per capita plus 1,000 million yards for exports.

Assuming that per capita consumption @ 20.3 yards for a population of 434 millions will be acceptable to the Planning Commission on the basis of memorandum furnished by the Indian Cotton Mills Federation. Bombay, the production of indigenous textile machinery for spinning, weaving and processing shall have to be expanded in the III Five Year Plan period.

In U. P. during the II Five Year Plan, the Government of India has issued a licence for manufacture of draw frames, speed frames and ring frames in private sector.

The following table will show the total average annual requirements of machinery, including stores items in value during the III and IV Plan periods as worked out by this Working Group.

Sector.	Average annual requirement of machinery in value (in lakhs of rupees)	
	III Plan	IV Plan
(1) Cotton:		
(a) Spinning & Weaving.	1439.450	1870.125
(b) Processing.	439.100	539.930
(2) Art Silk:		
(a) Preparatory & Weaving.	152.750	473.500
(b) Processing.	65.080	196.230
(3) Silk:		
(a) Preparatory, Weaving and Processing.	17.800	17.500
(4) Woollen:		
(a) Wool Tops.	83.020	Nil
(b) Spinning, Weaving and Processing.	230.250	231.250
(5) Items of stores.	328.720	328.720
Total :	2756.170	3657.255

The Working Group after collecting lot of data and after lengthy discussion came to the conclusion that under the III, IV and V Plan periods there did exist scope for expansion of Textile Machinery manufacture in U.P. under private sector. It was, however, thought that a scheme for mnufacture of sizing machine alone would not be adequate. It was accordingly decided to recommend establishment of a unit to manufacture following additional textile machinrey in III Five Year Plan, with a capacity for further expansion during IV and V Plan periods.

Sl. No.	Name of machines.	Nos. per year.	Rate for each in Rs.
1.	Clip Stenters and Hot-air Stenters.	12	50,000|-
2.	Tensionless Automatic Dyeing Jiggers.	36	15,000|-
3.	Multi-colour Printing Machines.	2	75,000|-
4.	Open Width Continuous Bleaching Plants.	1	1,00,000|-
5.	Other Processing machinery like Mercerisers, Polymercerisers, Singeing machines etc.,	Quantity and value depending upon types and demand.	

The Working Group decided that a unit as above should be set up in III Plan period to save foreign exchange.

(5) *Development of Jute Industry in U. P*:—In U.P. we have 3 big Jute manufacturing units, two being located at Kanpur and the third at Sahjanwa (Gorakhpur). The Cost Accounts Officer of the organisation of Jute Commissioner, Government of India, who was associated with the Jute Industry Sub-Committee in a lengthy answer to an earlier questionnaire intimated that as the scope and size of the Jute Mill Industry were examined in detail by the ad-hoc Committee on Jute mill machinery (1959) and the Committee being of the view that there would be no scope for the installation of additional loomage in the industry in the III and IV Five Year Plans, the question of establishment of any further unit in U.P. does not arise.

The following table will show the relative financial assistance extended to the Jute units in U.P. for modernisation.

	Fine Side Requirements		Coarse Side Requirements	
	Using own resources	Using NIDC funds	Using own resources	Using NIDC funds
J. K Jute Mills, Kanpur	21 per cent.	14 per cent.	79 per cent.	86 per cent.
Maheswari Devi Jute Mills Ltd., Kanpur	Nil	Nil	Nil	Nil
Mahavir Jute Mills Ltd., Sahjanwa	Nil	Nil	Nil	100 per cent

It was in the context of the above that the Working Group considered the establishment of a unit for Jute Spinning and Weaving in U.P. The discussions mostly centred round the poor quality and inadequate quantity of Jute production in U.P. which was insufficient for the 3 units in U.P.

The Working Group came to the conclusion that efforts for production of quality jute in the State should be greatly stressed and the quantity may also be increased during the III Five Year Plan. The scheme for establishment of a new unit in U.P. should thus be deferred to IV Five Year Plan.

(6) *Woollen Industry in U. P:*—The consumption of woollen goods in India is low in comparision to other countries. The development programme for the woollen textile industry as envisaged for mill sector in the Second Five Year Plan is summarised as under:—

Spindlage and Loomage:	1955-56	1960-61.
Woollen sector spindles	61,032	62,768
Worsted sector spindles	96,416	1,23,416
Powerlooms	3,950	4,051

The following table gives details of organised woollen mills in the country:

		Total Units		
S. No.	States.	Purely spinning mills	Purely weaving mills	Composite mills.
1.	Bombay.	6	3	8
2.	Madhya Pradesh.	—	—	1
3.	Mysore.	1	—	2
4.	Punjab.	20	100	10
5.	Uttar Pradesh.	2	—	3
6.	West Bengal.	2	1	1
7.	Delhi.	1	—	—
8.	Jammu and Kashmir.	—	—	1
	Total:	32	104	26

The regional distribution of woollen mills, their capacity at the end of 1955-56 and the ultimate capacity expected to be achieved by 1961 are as under:—

	Capacity at the end of 1955-56				Ultimate capacity after all the expansion schemes have been implemented (Numbers		
States	No. of units	Woollen Spindles	Worsted Spindles	Power looms	Woollen Spindles	Worsted Spindles	Power looms
Bombay	12	12,226	47,936	605	12,226	61,056	654
Saurashtra	1	2,130	7,032	84	2,130	7,032	84
Mysore	3	10,478	.. .	221	10,478	..	221
Uttar Pradesh	4	12,358	9,672	368	12,358	9,672	368

Kashmir	1	1,542	1,500	18	1,542	1,500	18
West Bengal	5	1,380	5,094	76	1,620	6,494	106
Madhya Bharat	1	516	..	20	516	..	20
Punjab..	94	20,402	25,182	2,558	21,898	36,462	2,580
Delhi ..	1	..	..	..	..	1,200	..
Total	122	61,032	96,416	3,950	62,768	1,23,416	4,051

The demand for woollen fabrics is bound to increase in the III Plan period as a result of the increase in population and improvement in the income and living standard of the people.

The Working Group in its first meeting decided to discuss the expansion of woollen industry in U.P. as a separate question involving deeper probe in the matter primarily taking into account the requirements of the carpet industry localised in Mirzapur and Bhadohi (Varanasi) and earning huge foreign exchange.

On the basis of the data collected it was felt that there was shortage of mill spun yarn for carpet industry. It was, therefore, proposed that a unit for producing yarn, under private sector (a consortium) with location at Mirzapur or Bhadohi, should be set up in the III Plan. It should be capable of further expansion during IV and V Five Year Plans.

Summarising, the Group has recommended taking up of the following items under Textile Industry during the IIIrd Five Year Plan:—

1. Re-opening of closed cotton textile units and their rehabilitation.
2. Setting up of a purely spinning unit for superfine counts of yarn with an initial capacity of 25,000 spindles.
3. Re-placement of 10,000 plain looms with automatic looms.
4. Setting up of two units for weaving of acetate and union fabrics.
5. Setting up of an engineering unit for manufacture of sizing machines and other textile machineries and spare parts.
6. Setting up of a woollen yarn spinning unit for manufacture of carpet yarn.

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17. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'GOVERNMENT PRECISION INSTRUMENTS FACTORY, LUCKNOW.'

Introduction of Precision Instruments and Instrumentation Industries.

The important role which the instruments are playing in national life of advanced countries and also of less-advanced countries needs no emphasis or introduction to anyone who is connected with either of industry, education, research, agriculture, medical science etc. Since the application and use of instruments extend to a very large number of commercial and non-commercial institutions, they form the nerve centre of all large-scale industries by way of controlling processes of manufacture and the finished-goods at different stages. The variety and range of instruments, therefore, are enormous.

Whether it is temperature or humidity control, maintenance of pressure and vacuum, P. H. value or H. Ion concentration, conductivity, specific gravity, voltage, amperage, optical instruments, electrical and electronic instruments or medical and surgical instruments, the variety has to be developed to suit the particular part it has to play. Visual and sensory organs of the human beings have to be aided by different variety of instruments to reach correct conclusions. Naturally, therefore, a store of technical know-how is required.

The Working Group has considered only Mechanical and Electro-mechanical, Optical and Photometric and Electrical Measuring Instruments to be included in the expansion scheme during the Third Plan period under the control of the Government Precision Instruments Factory.

Before a detailed scheme is worked out, availability of necessary raw materials, machine-tools and technical know-how, establishment of training schemes for adequate supply of technical staff, quality control, standardisation, research and development, inspection and availability of complete manufacturing data have to be looked into. Until recently, the bulk of our country's requirement of instruments was imported and very recently some small industries have been established in the country to meet the national requirement, but they are completely inadequate. The main hindrance has been on the points mentioned above.

We still depend to a great extent on foreign resources for imported raw materials, machines and tools. But if we take in view the enormous foreign exchange which is needed to import Precision Measuring Instruments from foreign countries, the cost which we have to pay for the above imports is negligible. Therefore, even if we have to import certain items, there is ample justification for creation of instrumentation industry in this country. As for the technical knowhow, it is felt that foreign collaboration may not be needed. In the scheme for Electrical Measuring Instruments, therefore, it is suggested that two foreign experts be employed in the factory. We have already got one German expert in the factory who will serve as a technical expert for the Optical Industry in which he has specialised. The question of technical knowhow, therefore, can be tackled efficiently in this way.

The exact amount of imports of precision instruments is not available as the authorities concerned with imports do not maintain statistics.

on various types of instruments, and also those instruments which come to the country as a part of plant and machinery cannot be assessed. However, it is estimated that the present instruments of various types worth ten crores of rupees are imported every year.

The aim should be not only to produce first-grade instruments of high quality and design, utilising the most advanced techniques of manufacture, but also to keep abrest on and contribute to the latest developments in the field. Without this, the best quality raw materials and technique can neither be used nor evolved, nor fine design of instruments can be produced.

Quality of man is, no doubt, an important milestone for achieving success. Instrumentation industry is a branch of engineering which is highly specialised and which requires the highest type of skill and ability.

The other important factor which is to be kept in mind is that quick returns and easy money should not be the aim in the field of instrumentation if quality is not to be sacrificed. The knowledge and skill required in the industry are high and the experience required is rare. Success can, therefore, be achieved only in the hard way. It is with this background that the establishment of a Research cum-Design Centre and a a Central Control Office for all the group of industries of the Government Precision Instruments Factory has been suggested by the Working Group.

The number of trainees at present for the trades is 55 which has to be largely increased to cope with the requirement of technical personnel on the lower level and the posts of Apprentice Engineers and Apprentice Foremen also have to be increased to a great extent in order to train sufficient number of good engineers to take up the responsibilities after the building has been constructed and machinery installed. All the schemes discussed in the foregoing paragraphs will be treated as 'commercial' except the Research-cum-Design Centre which will be a 'non-commercial wing' of the Government.

The other point which is to be taken into consideration is that an industry which is going to be included in the Third Plan under the purview of the Government Precision Instruments Factory should have commercial quality instruments, side by side, with high degree instruments. Then only the scheme can be self-sufficient. The manufacturing programme of a single factory should be preferably restricted to a certain category only and different types of instruments should be manufactured in different factories to give full scope for the industries to grow and specialise. The commercial instruments will follow the line of mass production while the high precision instruments will have to be produced by batch production methods.

The expansion scheme of the factory for the Third Plan envisages establishment of an organisation for Instrumentation Industry, a Research-cum-Design Centre, Mechanical Instruments Factory, Optical Instruments Factory and Electrical Measuring Instrument Factory.

Brief Review of the Working of the G. P. I. F. in the First and Second Plans.

The Government Precision Instruments Factory was set up by the Government of Uttar Pradesh in the year 1950 to promote and encourage Precision Mechanics. It was, then, the first institution of its kind and even today is one of the pioneer institutions in engineering industry in this country. In the first year of the establishment of this Factory in the First Plan period, it produced only 424 Water Meters. A steady increase in the production was maintained, with the result that the production went up to 13,331 Water Meters in 1955-56 which was the concluding year of the First Plan.

A 300 per cent higher target of production was fixed in the Second Five Year Plan in respect of Water Meters and Misroscopes. Since the Factory was required to raise the production to 36,000 Water Meters and 300 Microscopes a year, it was realised that if the Factory was to function efficiently and the production target as laid down for the Second Five Year Plan was to be achieved, the Factory should have its own premises including buildings and also the latest machinery. To execute the expansion programme a sum of Rs. 14,35,000/- was sanctioned by the Government for the purpose.

The new Factory building is considered to be one of the best laidout workshops in this country. The Canadian High Commissioner in his visit to the Factory wrote, *"I am greatly impressed by the orderly layout, cleanliness and general appearance of the whole factory. In short the factory should be an example to Indian industry of how to set up and run a plant"*. Soviet Delegation for Optical Glasses in their visit to the factory expressed, *"The experts found that the designing of the factory has been done with profound knowledge of technology and that the factory is equipped with modern machine tools and instruments"*. As regards the machining operations and workmanship, the U. S. Trade Mission observed, *"The best machining operation I have seen to date in India. It is a fine setup."*

From the above, it will be found that the present staff of the Factory can be fully relied upon to execute the expansion projects, which may be entrusted to them, whether they relate to the technical skill, specialisation and standardisation or to organisational performances, such as managerial and commercial. Apart from this, the Factory at present has a well-equiped Machine Shop, Assembly Shop, Electroplating Shop for nickel and chromium plating, Painting Shop for brush and spray painting and Stove Enamelling, Dial-making Shop for printing and enamelling of dials, Carpentry Shop, Maintenance & Repairs shop, Toolroom for manufacturing dies, jigs and tools, Heat-treatmnt equipments and the like, where the skill and specialisation have been developed to tackle intricate problems of precision mechanism. With the provision of a Research Officer and Laboratory equipment, the long-felt necessity for research and design has also been met to a great extent. However, this may not be sufficient to tackle the problems of design and new instruments and for that purpose a self contained scheme has been incorporated in the undergoing paragraphs.

The target of the Second Plan period with regard to Water Meters and Microscopes was achieved during the third year of the Second Plan, *i.e.* much ahead of the schedule. Considering the fine achievement of the Factory, the Government of India and the Government of Uttar Pradesh included few more items of manufacture in the Second Plan, *i.e.* Pressure Gauges and some Medical Instruments. Further funds, therefore, were provided and total capital requirement during the Second Plan period was raised from Rs. 14,35,000/- to Rs. 22,43,500/-.

We are giving below the production of Water Meters and Microscopes in the First and Second Plans and the Profit & Loss Account yearwise of the Factory (till 1958-59) which will show that the Factory has a good record of all-round achievements and has affected saving in foreign exchange well above eighty lacs of rupees:—

Production of Water Meters and Microscopes:

Years.		Water Meters.	Microscopes.
First Plan:			
Upto 1953	..	4,051	54
1953-54	..	6,801	112
1954-55	..	9,883	97
1955-56		13,331	32
Total		34,066	295
Second Plan			
1956-57	..	19,004	76
1957-58		23,328	131
1958-59		36,141	263
1959-60 (Upto Aug. '59)	..	15,112	125
Total		93,585	595
Grand Total	..	1,27,651	890

Profit (+) *and Loss* (—) *Account.*

Years.		Gross Profit (+) Loss (—)	Net Profit (+) Loss (—)
First Plan:			
Upto 1953	..	—3,09,976	—3,79,516
1953-54	..	+ 23,973	— 56,611
1954-55	..	+1,40,858	+ 31,816
1955-56	..	+1,61,189	+ 56,400
Second Plan:			
1956-57	..	+1,96,105	+ 91,601
1957-58	..	+2,77,898	+1,24,596
1958-59	..	+5,37,912	+3,50,926

The targets for the Second Plan are as follows:—

1. Water Meters	..	36,000 per year.
2. Microscopes	..	300 per year.
3. Pressure Gauges	..	12,000 per year.
4. Stethoscopes	..	4,000 per year.

As already mentioned, the targets in respect of Water Meters and

Microscopes have already been achieved while work is in progress for the manufacture of Pressure Gauges and Stethoscopes.

Necessity for expansion in the Third Plan.

The Government Precision Instruments Factory is the only Factory in the country which manufactures the above items on an appreciable scale. Demand in the country for the Factory's products is much more than its capacity and as the country would further industrialise, the demand would also increase proportionately. Prospects of export are also very bright. Enquiries have been received from the Government of Burma, Nepal, Iraq, Indonesia and Egypt. But on account of heavy home consumption, the Precision Instruments Factory Committee in its meeting held at Nainital on 16th June, 1959, did not accept the export policy for the time being. Nevertheless, there are strong factors for expanding the Factory's production.

The second point to be kept in view is that in order to stand in competition while exporting our instruments and also in the home market, it is necessary that production cost should be brought down and the quality of products raised. This, in turn, is entirely dependent on the quantity of production and specialisation.

Justification for carrying out the expansion under the control of G. P. I. F.

As regards specialisation, the Factory has now gained sufficient technical know-how and has successfully achieved the Plan targets. The quality has improved from year to year. How far the Factory has been successful in specialisation and standardisation will be clear from the fact that inspite of several-fold increase in cost of raw materials and labour charges, the increase in the cost of products of the Factory is negligible. In the tenders invited by the DGS&D vide Tender Notice No. STV-6/1832-K/2WM, the rate quoted by our Agents for the Inferential Dry Dial Water Meters of 1/2" size was Rs. 61 while Messrs Turner Hoare & Co. and Voltas Ltd. quoted Rs. 110 and Rs. 99 respectively. Both of the two latter firms are indigenous manufacturers.

The specialisation has been carried out to such an extent that the only component which was hitherto being imported from abroad in respect of Water Meters, namely Jewel Stone, is also going to be manufactured in the Factory itself. The plant for which an order was placed with a firm in Switzerland has since arrived and is being installed. In Microscopes also, the only component which we are importing is Optics, which, of course, will have to be purchased for some time till the Government of India's factory in Durgapur starts production of optical glasses and arrangements for grinding them have been made. In the Pressure Gauges, we have to import for the time being only one component, *i.e.*, Bourdon Tube. Hair Springs are going to be manufactured by a firm in Calcutta and negotiations are afoot with them.

We have neither borrowed specialised technique from foreign countries nor have copied them blindly. The techniques have been developed to suit the Indian conditions. While productivity methods, rationalisation and introduction of modern specialised machines and automatics have received our due consideration at all times, we have not overlooked the production economics as a whole from the point of view of cheapness of labour in the country and the extent it could be trained and adopted in the advanced techniques of manufacture. From the point of view of technical skill and specialisation, therefore, the Factory has gained a good knowledge and has strong grounds to expand the present production and implement the new items of production. There is a regular scheme for training of Trade Apprentices, Apprentice Foremen and Apprentice Engineers and it is expected that the Factory would not feel any dearth of good technicians in case the expansion programme is entrusted to it for execution.

Guiding Factors for Expansion

The main principle underlying the expansion programme is to follow the line of mass production with a view to specialise on the production technique which, in turn, would reduce the cost of production and increase the efficiency of the instruments and would introduce inter-changeability of parts. This can be done only when there is a good laboratory to carry out researches, a Design Section for making designs, patterns and prototypes and a well-equipped toolroom for manufacture of dies, jigs, tools and fixtures. The production technique has advanced to such an extent that researches and experiments have become an essential part of an industry in order to improve its products and stand competition in the market.

Connected with this, there are innumerable problems relating to wage structure, personnel and technical management, procurement of raw materials, sales, advertisements and publicity of the finished-goods, training of workmen, technicians and engineers, in the face of which divulgence of attention on several products is bound to tell adversely on industry, and will increase the overheads disproportionately. The only way to bring down the overheads to a reasonable limit, without impairing efficiency and cost of production, therefore, is to mass-produce few items and specialise and standardise them.

Keeping in view the above, the principles of expansion can be summarised as below:—

1. Specialisation and expansion of the present products.
2. New items which can broadly fit in the present technique of the manufacturing programme.
3. Items requiring completely new technique.

The items included in the III Plan have been arranged in the order of priority with a view to utilise the available resources to optimum limit and raise the quality and standard of the instruments to a high level.

As regards the Master Plan the Working Group was of the opinion that the following items should be deferred to Fourth and Fifth Five Year Plans:—

(*i*) Photographic equipment.

(*ii*) Refractometers,

(*iii*) Spectroscopes, visible, ultraviolet and infrared,

(*iv*) Polarimeters,

(*v*) Photometers,

(*vi*) Spectrophotometers,

(*vii*) Monochromators,

(*viii*) Optical precision measuring instruments.

(*ix*) Instruments for measuring lengths and angles,

(*x*) Optical dividing heads,

(*xi*) Stereoscopes,

(*xii*) Wet dial type water meters,

(*xiii*) Rotameters,

(*xiv*) Dial Indicators, and

(*xv*) Micrometers, etc.

The Working Group further felt that there is a great scope for the establishment of a unit to manufacture Dash Board Equipments. So far there is no unit in the country which is manufacturing Dash Board Equipment and the demand is very huge. All the members were of the opinion that a large-scale unit, if possible, should be established in the Third Five Year Plan for manufacturing Dash Board Equipment of cars, trucks, tractors and the like, preferably in the private sector.

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Lucknow.

18. SUMMARY REPORT FROM THE CONVENER OF THE WORKING GROUP ON 'U.P. GOVERNMENT CEMENT FACTORY, CHURK'.

A separate Working Group of the Heavy Industries Plan Committee was constituted for the U.P. Government Cement Factory under instructions issued by the Government in the Industries Department. By the very nature of its constitution the Working Group has confined itself to proposals which could legitimately be taken as part of the expansion plans of the U.P. Government Cement Factory and in relation to the availability of raw materials and other facilities in this area.

2. With the establishment of the U.P. Government Cement Factory, Churk the State Government had taken the first step in setting up a major heavy industry in the public sector. During the Second Plan period the expansion project of the Factory was sanctioned by the State Government, envisaging raising of the production capacity from 700 tons per day to 1400 tons per day. In addition, a Pilot Fire-bricks Manufacturing Plant was also sanctioned by the Government during the Second Plan period. The expansion project of the Factory is under implementation and is expected to be completed by the end of the Second Plan. The Pilot Fire-bricks Manufacturing Plant is expected to go into commission within a month or so.

3. The U.P. Government Cement Factory is located in the interior of the Mirzapur district and lies almost in the south-east corner of Uttar Pradesh. Mirzapur district and particularly the area in which the Factory is located is a chronic scarcity area in a backward and underdeveloped region. Inspite of this Mirzapur district is rich in mineral deposits and in view of its location is particularly suited for rapid industrialisation. The Factory is connected by rail with the construction of the Chunar—Churk line of the Northern Railway. It is also very well connected by a first class *pucca* road. With the proposed extension of the railway line connecting Churk to Garhwa Road, facilities for industrialisation of this area will be available. The coal fields will become appreciably nearer to this area with obvious advantages. In addition the Singrauli coal fields which lie across the borders of Mirzapur district will also be available for the industrial projects which may be set up in this area. As regards power requirement, it may be mentioned that biggest hydel power project of the State is located at Pipri in the Mirzapur district. It is also understood that another dam is proposed to be constructed near Obra for increasing the availability of hydel power. In addition, it is understood that a very big thermal station is proposed to be set up at Mugalsarai which is also not very far from this area.

4. As already mentioned earlier, this district is rich in mineral deposits which can be easily exploited for large scale and heavy industries. Limestone deposits exist in huge quantities not only in the Factory quarries which are proposed to be extended upto Makribari but in other areas of the district also. Crystalline limestone deposits of almost 3 million tons are reported to exist in Obra Hill of this district. Further limestone deposits of equally pure quality have been found in the Khajrahat Hills near Kanhar river in the district. About five million tons of fireclay deposits have been located in the Bansi area of the district. Quart-

zites and other mineral deposits have also been discovered in the Mirzapur area, while very good quality sand is available near the Factory site.

5. In addition to the availability of raw materials, fuel and power which amply justify setting up of large scale and heavy industries in this area, the Working Group also considered the other facilities which would be available by the localisation of industries near the Factory. This Factory is a heavily mechanised unit and experienced staff has been engaged. The Factory is being run entirely by the staff of Indian engineers and a very well equipped Laboratory has been set up to exercise vigilant control. True to the traditions of a social welfare state a number of amenities have been provided for the welfare of the workers including hospital, education, sanitation, canteens, parks and gardens etc. Adequate arrangements for water supply and sewerage system also exist. If an industry is set up in a new area all these things will have to be provided anew which will prove to be very costly and may make the unit uneconomic. With the sanctioning and setting up of the Pilot Fire-bricks Manufacturing Plant the Factory will acquire practical experience for launching out schemes for refractories, sanitary-ware etc.

6. The history of cement industry in this country is one of dynamic growth. Starting with humble beginning the cement industry has made a very rapid progress and has more than doubled its capacity. The Planning Commission have proposed to increase the production capacity of cement still further in the Third Plan period. In the context of the growth of cement industry it is necessary to find avenues for the utilisation of the product in the country. It is accordingly felt that cement-based industries like construction of cement poles, sleepers, pre-stressed concrete pipes etc. should be set up. The development of cement-based industries will not only provide an outlet for the heavily increased production of cement but will also save valuable foreign exchange.

7. It may be mentioned here that the fire-clay deposits in the Bansi area of the Mirzapur district lie at a distance of 45 miles from the Factory. First class road from Dalla to the Factory site already exists but it would be necessary to construct a road from Dalla to Bansi which is a distance of about 21 miles. It is understood that the construction of this Dalla-Bansi road had been sanctioned in the past but was given up for some reasons. With the discovery of mineral deposits in any area the paramount necessity of providing proper transport facilities for the exploitation of the deposits cannot be over-emphasised. It is felt that it should be the duty of the State to provide necessary transport facilities to encourage the growth of industries whether in the private or public sector. No private entrepreneur can be expected to construct a road or a railway track for setting up an industry and it is for the State to develop the areas with potentialities for industrial development. The road construction programme to connect the mineral deposits should accordingly be given top priority in the State Plans of Road Construction.

8. Although the Geological Survey Department have already located deposits of crystalline limestone (Marble), fire-clay and other mineral deposits in the Mirzapur district, it would be necessary for more intensive search to be continued in order to assess not only the quantity but the quality of the deposits discovered. Accordingly the Geological Survey Department will have to extend their assistance in this direction so that industries could be firmly planned and their economics worked out.

9. Keeping in view the considerations enumerated above the following schemes were adopted as part of the expansion programme of the

U.P. Government Cement Factory during the Third Plan period, in order of priority:—

(*a*) Refractories Plant.
(Fire-bricks, Sillimanite and Silica bricks)

(*b*) Pre-stressed Concrete Pipes and other cement-based products.

(*c*) White Cement.

(*d*) Calcium Carbide and allied products.

(*e*) Stone-ware pipes and other products.

(*f*) High Alumina Cement Plant (Refractory Cement).

(*g*) Steel alloys, castings and forging.

10. Nucleus reports relating to all the above schemes have been separately drawn up. It may be mentioned here that for preparation of some of the schemes detailed information could not be available but efforts have been made to draw up the nucleus reports on the available data. Some of the schemes have vast potentialities for further development both in themselves and in the establishment of subsidiary industries. With the experience gained in setting up these industries as well as running them during the Third Plan period it may be feasible to take up further expansion schemes in subsequent plan periods. In the IV Plan period, it may be necessary to establish another cement factory in district Mirzapur.

11. In drawing up the nucleus reports it has been kept in view that the size of the units should be economic and very small units have been avoided. It may also be mentioned here that all the schemes have been proposed for inclusion in the public sector which is a necessary corollary of their being considered as expansion schemes of the present Factory. All these seven schemes proposed for inclusion during the Third Plan period are briefly reviewed as follows:—

(*a*) *Refractory Plant (Fire-bricks, Sillimanite and Silica bricks)*: —In view of the rapid industrialisation of the country proper development of the refractory industry has become very essential. No refractory plant exists in Uttar Pradesh and with the location of good quality large scale deposits of fire-clay in the Mirzapur district, the establishment of a refractory plant in this area appears to be more than justified. The experience in running the pilot refractory plant at the Factory will be turned to advantage in running a regular refractory plant. Although initially it was proposed to set up a refractory plant with about 20,000 tons yearly capacity and to extend it further gradually, it was subsequently decided that in view of the demand for refractory material and in order to make it a more economic unit, the capacity of the plant should be 36,000 tons annually including manufacture of silica and sillimanite bricks as well as mortars and insulating materials. It has already been mentioned earlier that it would be necessary to construct a 21 mile road from Dalla to Bansi and that it was not feasible to include the cost of construction of this road in the project.

(*b*) *Pre-stressed Concrete Pipes and other cement-based products*: —In modern industrially advanced countries establishment of cement-based industries has kept pace with the development of the cement industry itself. Cement industry in India has occupied a prominent place and serious thinking has now to be given to utilising the increased production. The Working Group was of the opinion that there was a vast scope for development of this field. The location of this plant near the Factory would be ideal from several points of view.

(c) *White Cement*:—There was some difference of opinion in the Working Group regarding the demand for white cement which could justify setting up of a white cement plant. However, with the growth and development of towns and modern architectural techniques there does not appear to be any doubt about the marketing possibilities of white cement. White cement has been selling at a very high rate and even indigenous white cement which does not compare favourably with the foreign white cement is sold at the rate of Rs. 400/- to 500/- per ton. Substantial deposits of white marble have been discovered in the Obra and Khajrahat Hills in Mirzapur district. It was accordingly decided that a 6,000 ton (annual capacity) white cement plant should be set up near the Factory at a total cost of about Rs. 15 lakhs. Particular mention may be made here of the fact that the State Government will have to acquire the marble deposits located in the Obra and Khajrahat Hills as a prerequisite for setting up the proposed industry.

(d) *Calcium Carbide and allied products*:—The Calcium Carbide industry has vast potentialities for development as it is utilised in a number of industries and can also help in setting up many subsidiary industries. Calcium Carbide is mainly used for the manufacture of Acetylene gas which in turn can be used for many industrial purposes. Setting up of a Calcium Carbide plant with an annual capacity of 6000 tons is accordingly amply justified and its capacity could be further increased in subsequent Plan periods. Good quality limestone already exists in the Obra and Khajrahat Hills and the plant can thus be suitably located in the vicinity of the Factory.

(e) *Stone-ware Pipes and other products*:—With the growth of modern towns of which U.P. has a more than proportionate share, the demand for stone-ware is rapidly increasing. There is no stone-ware factory in this State and in view of the availability of raw materials and other resources it is felt that establishment of a stone-ware factory in Churk is essentially justified.

(f) *High Alumina Cement Plant*:—High Alumina Cement also known as "Cement Fondu" is very much in demand with the rapid industrialisation of the country. Both laterite and limestone are available very near Churk and thus establishment of a High Alumina Cement Plant at Churk is clearly indicated. The total cost of the project is Rs. 20 lakhs with an annual capacity of 6300 tons.

(g) *Steel alloys, castings and forging*:—It has already been indicated earlier that Mirzapur district has very great potentialities for industrial development both in view of presence of mineral deposits as also resources of fuel, power etc. An aluminium factory in the private sector is already being set up in this district near Rihand Dam site. With the emphasis on setting up of steel plants considerable quantity of pig iron would be available. There is also no dearth of scrap. It will thus be seen that the raw materials required for setting up Steel Casting Foundry and other steel-based industries wil be readily available. Moreover, with the industrialisation of the country and setting up of heavy industries the demand for alloy, castings and other metallurgical products is bound to increase considerably. There is a conspicuous dearth of such projects in the country and it is high time that steps are taken to set them up to meet the increasing demand in the country and to save foreign exchange in importing the requirements from foreign countries. Churk offers an ideal location for setting up the proposed plant. Initially, however, it has been proposed to set up a 6000 ton (annual capacity) plant at a total cost of Rs. 50 lakhs, which could be appropriately expanded in the subsequent Plan periods.

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PART—B

GENERAL OBSERVATIONS ABOUT SCHEMES PERTAINING TO ALL THE GROUPS :

19. INDUSTRIAL RESEARCH.

The importance of industrial research, in the context of the huge planning for development of large and medium scale industries in the State, during the Third Five Year Plan, could hardly be over-emphasised. So far, we only have the Scientific Research Committee which deals primarily with the fundamental and pure research. For dealing with applied and industrial research, it would be necessary to form another committee which may be named as Industrial Research Committee. The research schemes sponsored by this Committee could be handled by various technical institutions in the State—chiefly the H. B. Technological Institute, which, with the establishment of the Indian Institute of Technology at Kanpur, is proposed to be converted into an Industrial Research Centre.

2. With the establishment of the Indian Institute of Technology, which would be a veritable centre of learning in all important branches of engineering, the existing resources of the H. B. Technological Institute are to be profitably utilised for industrial and technological research. This proposal for an Industrial Research Centre has already been discussed at some length with the Government of India, and an Expert Committee is being appointed to make detailed recommendations about it. As such, it is not proposed to discuss the details of this scheme here. It is necessary, however, that the proposal is put through as early as possible.

3. Together with industrial research post-graduate teaching could continue at this Centre, as it may help in building a proper research atmosphere. The under-gradute teaching would, of course, be taken over by the Indian Institute of Technology.

4. It is of paramount importance that in the interest of industrial development of the State, the processes relating to manufacture of products obtainable from its resources, are fully developed through the establishment of the proposed Industrial Research Centre. Even in the cases where no research work is needed before taking up production on a large scale, it would always be advisable to have pilot plants set up for arranging trials of manufacturing processes, in order to ascertain industrial potential in each case. The process could be adopted on a commercial scale, only after successful working of the pilot plant. A laboratory for pilot plants would thus be an indispensable adjunct to the Research Centre.

5. It is hoped that the Expert Committee being appointed for working out details in this behalf would do full justice to the proposition, and that requisite help would also be forthcoming from the Council of Scientific and Industrial Research. Meanwhile, it is recommended that with the conversion of the H. B. Technological Institute into the proposed Industrial Research Centre, it may be entrusted with the following functions:—

(*i*) Applied and Industrial Research to serve the industry in the State, both in the public and private sectors.

(*ii*) Fundamental Research in Applied Microbiology, Fermentation Technology and Oil Technology.

(*iii*) Pilot Plants Laboratory for making semi-industrial trials to prove commercial exploitability of various processes.

(*iv*) Continuance of testing work as being carried out at present.

Just as there is the proposal for establishment of Industrial Research Centre to deal with all chemical industries, there is need for a full-fledged Design-cum-Research Centre for engineering industries, where prototypes of tools and instruments could be devised, designed and then produced on a pilot plant scale, before taking up the scheme on a commercial basis. Research and experimentation are, in fact, an essential part of the industry and must be given constant attention so as to ensure improvement in the design and manufacturing technique of the products.

2. In this context, it may be mentioned that the Government Precision Instruments Factory, Lucknow, is proposed to be developed into a centre for "Instrumentation", to take care of a large variety of instrument industries. The Working Group for the Factory has already suggested establishment of a Design-cum-Research Centre in the Factory. The centre would select suitable items for manufacture, carry on research work on them, design them, make prototypes and thereafter test the prototypes. Once a prototype has been successfully evolved in the laboratory, and the scheme for manufacture on commercial lines formulated, dies, jigs and fixtures would have to be designed and manufactured. All this work would have to be done very efficiently and accurately in order to ensure proficiency in production.

3. It may be agreed that establishment of the proposed Design-cum-Research Centre at the Government Precision Instruments Factory would be advantageous, in view of the fact that the Factory has already been in the line for quite some time. However, the proposed centre may be financed through a separate budget grant, so as not to burden the commercial working of the Factory. This would be necessary, all the more, because the centre would have to tackle the problems not only of the Government Precision Instruments Factory, but also of various other Government Departments and public institutions. The Government Precision Instruments Factory would make available land and other amenities to the proposed centre, which would also be benefited by the practical experience the factory has gained so far in its line.

4. The centre may be adequately equipped so that in its working it does not have to depend upon any external source, except in special cases. To start with, it may be designed to have the following structure, with requisite equipment and working personnel:

(*i*) Laboratory and Research Section.

(*ii*) Design Section (including Drawing Section).

(*iii*) Workshop (for manufacturing prototypes).

(*iv*) Testing Section (for prototypes).

(*v*) Toolroom (for manufacture of tools, dies, jigs and fixtures).

21. TECHNICAL MAN-POWER RESOURCES—AUGMENTATION OF—

The Working Group separately constituted for Technical Education in the State has been looking into the question of requirement of technical man-power, in the context of the programme for industrialisation of the country in general and the State in particular. It is understood that in its report this Working Group would give a full appraisal about the requirements and resources of technical man-power, including craftsmen, diploma-holders, graduates and post-graduates, *vis-a-vis* the general programme for industrial development of the State as envisaged for the Third and subsequent Plan periods. However, for specific projects envisaging development of large and medium scale industries in the State during the Third Plan, as included in this Report, it is felt that the resources of technical man-power, particularly for post-graduation, should be adequately augmented. Following recommendations in this context are accordingly made:

(1) *Paper and Pulp*:—Apart from the chemical engineering courses at the degree level, there should be a cellulose technology course at the post-graduate level. The H. B. Technological Institute may take it up, with its conversion into the proposed Industrial Research Centre. The intake should be 10 persons—5 from chemical engineering and another 5 from M. Scs. in organic chemistry.

Basic and applied research in cellulose technology would also be done at the H. B. Technological Institute.

(2) *Plastic and Allied Products*:—A course in high polymers, just like cellulose technology course, should be introduced at the H. B. Technological Institute.

(3) *Applied Microbiology*:—A course on this subject at the post-graduate level, is already being run at the H. B. Technological Institute.

(4) *Catalysis and Reaction kinetics*:—A course in catalysis and reaction kinetics might be introduced at the H. B. Technological Institute, at post-gradute level.

(5) *Silicate Technology*:—It is felt that there should be a silicate technology course at the post-graduate level. This could profitably go to Banaras Hindu University, as this University is already running a graduateship in silicate technology. There should be three sections under this course, *i.e.* (*i*) glass engineering, (*ii*) refractory and cement and (*iii*) ceramics, the intake for the first two items being fixed at 10 each, while for the third item at 5. This would take into account the size of the present graduate course at the University in silicate technology.

Such a course could also be started at the H. B. Technological Institute.

(6) *Fertilizers and Heavy Chemicals*:—There should be a post-graduate course in heavy chemicals technology. This could be taken up easily by the Indian Institute of Technology, which would already be running chemical engineering courses at the graduate and post-graduate levels.

(7) *Fine Chemicals and Pharmaceuticals*:—It would be useful to introduce post-graduate courses in (*i*) fine chemicals and pharmaceuticals and (*ii*) dye stuffs and intermediaries. Being already in the line, the Banaras Hindu University could take up the same.

(8) *Oil Technology:*—Two post-graduate courses in (*i*) oils, fats and waxes and (*ii*) paints, varnishes and detergents are already running at the H. B. Technological Institute. It might be examined if further courses in oils and paints engineering and essential oil technology, at the same level, should also be undertaken there.

A course in petroleum technology could be usefully introduced in the Indian Institute of Technology.

(9) *Food Technology:*—The H. B. Technological Institute might take up a post-graduate course in food technology, open to M. Scs. in organic chemistry or B.Scs. having studied botany.

(10) *Forest Products:*—A post-graduate course in wood technology might be taken up at the Forest Researlh Institute Dehradun. It is understood that courses in Pulp and Paper and Preservation and Seasoning of wood already exist at that institution. This institution should also provide facilities for testing the suitability of forest raw materials proposed to be utilised in different industries.

(11) *Leather and Allied Industries:*—A diploma course in leather technology and another at degree level, it is understood, are already being introduced at Agra and Kanpur, respectively. This might be sufficient for the time being.

(12) *Electrical Engineering:*—The Banaras Hindu University should take up a course in electronics, apart from such a course being already run at the Roorkee University. Post-graduate courses on the following subjects also may be undertaken at the Indian Institute of Technology:—

(*i*) Electrical Design Technology.

(*ii*) Electronics.

(*iii*) Transisters.

(*iv*) Electrical Instruments

It may be mentioned that post-graduate courses in (*a*) Power system and stability, (*b*) High Voltage Engineering and (*c*) Servo-mechanism and control are proposed to be taken up in Roorkee University according to the recommendations of the Working Group on Technical Education.

(13) *Instrument Industries* :—A post-graduate course in instrumentation would have to be taken up by the Indian Institute of Technology. It may be supplemented suitably and a similar course may also be introduced in the Banaras Hindu University.

(14) *Metallurgy:*—The Banaras Hindu University has a degree course in mining and metallurgy. The Roorkee University and Indian Institute of Technology would also be having similar course. The latter Institute may further have post-graduate courses in (*i*) Metallurgy, (*ii*) Aerodynamics, (*iii*) Air-craft Engineering, and (*iv*) Internal Combustion Engine.

Post-diploma course in the subjects like forging, foundry, automobile engineering and refrigeration mechanics, could also be profitably introduced.

(15) *Sugar Industry:*—The National Sugar Institute at Kanpur is already looking into the requirements of technical man-power for this industry.

(16) *Textiles:*—Post-groduate courses in textile chemistry and textile technology might be introduced at the Government Central Textile Institute, Kanpur.

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22. ESTABLISHMENT OF HEAVY INDUSTRIES CORPORATION.

With the huge planning for development of large and medium scale industries in the State, it would be necessary to have a suitable administrative machinery to be entrusted with the implementation of the projects, which the State Government may decide to take up after consideration of a preliminary project report prepared for a particular industry. Wherever necessary, basic industries will have to be sponsored by the State. Such industries, though they may not be initially attractive, are essential for building up industrial structure of the State and/or region where they are located. In other States which are industrially advanced, such key industries had to be taken up by the State Governments, before their present industrial pattern could be built up. Apart from the categorisation made in the Industrial Policy Resolution of the Government of India, the private sector, generally speaking, does not interest itself in producer goods industries. Since they have an eye on the market and on the short-term turnover of goods, they always wish to take to the consumer goods industries. The producer goods industries, particularly the basic industries, have thus to be taken up rather inevitably by the public sector, either exclusively, or at the most, in collaboration with the private enterprise.

2. No doubt, establishment of such industries by the State Government would require considerable support, financial and otherwise, from the Government of India. It is felt, however, that once the State Government have been able to take up a venture, requisite help would be forthcoming from the Government of India. Since various industrial projects are closely linked to one another it is hoped that with the establishment of some units by the State Government, other related units would stand good chances for being located in this State.

3. In order to implement the various projects to be undertaken by the State Government, as also to ensure efficient management and working of these undertakings, it would be necessary to establish a Heavy Industries Corporation in the State. The Corporation might be vested with an autonomous status to undertake and execute all projects found economically and technically sound and taken up by the State Government. With this status, the Corporation could function efficiently on the lines of a commercial undertaking. The Government machinery could thus devote itself to laying down the industrial policy, leaving the execution side to the Corporation. Comparatively unfettered by the financial, administrative, political and legislative limitations, the autonomous body of the Corporation would be free and fully equipped to continue smoothly its industrial activities, taking help from the Government of India and/or private sector, where necessary. It may also consider including in its domain the two already established undertakings of the State Government, *viz.*: the Government Cement Factory and the Government Precision Instruments Factory.

4. The Government of India have already been stressing over the need for the establishment of some such corporation for the State owned/managed commercial undertakings. They had even indicated that Central assistance by way of loans or grants would not be available

to State owned/managed undertakings, unless such undertakings had been incorporated under one or the other special enactments or as a company under the Indian Companies Act, 1956. The establishment of the proposed Corporation to undertake execution of industrial units in the (State) public sector, would thus also be meeting this requirement.

5. It is necessary that the Corporation, which may be named as the U. P. Heavy Industries Corporation, comes into being early in time for implementation of various projects that are now being planned out and may be taken up by the State Government. Licences for establishment of factories for manufacture of Refractories and High Tension Insulators and integrated units for Rayon Grade Pulp and Newsprint, under the Industries (Development and Regulation) Act, 1951, have already been applied for by the State Government. The preliminary work with regard to establishment of these factories would have to be started as soon as requisite licences have been granted by the Government of India.

6. Based on the above considerations, a skeleton of the proposal for establishment of the U. P. Heavy Industries Corporation is given below:—

(1) The U. P. Heavy Industries Corporation is conceived mainly as an instrument of the U. P. Government for securing a balanced and integrated development of large-scale and medium-scale industries, in both private and public sectors in Uttar Pradesh. Its object would primarily be the development of industries, particularly those which are necessary to fill up gaps in the industrial structure of the State.

(2) The corporation will formulate and execute projects for setting up new industries or developing new lines of production in existing industries. It will take up study and investigation of industrial schemes, and while implementing them, will try to ensure the maximum possible use of raw materials, industrial equipment and material resources available in Uttar Pradesh.

(3) The projects would be chosen primarily with a view to develop such lines of production where the country is exclusively or mainly dependent upon imports for the products, using such raw materials as are available in abundance in the State of Uttar Pradesh.

(4) The U. P. Heavy Industries Corporation would be registered as a private limited company.

(5) To strat with, the authorised capital of the Corporation would be Rs. one crore to be subscribed wholly by Government.

(6) The finances of the Corporation would be derived from grants and loans made by the Government of Uttar Pradesh and the Government of India.

(7) The Board of Directors of the Corporation, including both officials and non-officials, would be nominated by Government.

(8) The Corporation may set up subsidiary companies in its discretion.

(9) For execution of a particular project, the method adopted will depend upon the circumstances of each case. Although initially the capital may be raised wholly from Government sources, it is not necessary that this should be the case in all instances or for all times. The project might be executed by the Corporation itself or through one of its subsidiary companies. The project could also be executed in collaboration with private enterprise. The nature and extent of foreign financial and/or technical collaboration and participation, if any, would be decided according to the circumstances in each case.

23. DEVELOPMENT OF MINERALS—ESTABLISHMENT OF MINERAL DEVELOPMENT CORPORATION.

Uttar Pradesh has no insignificant mineral wealth. Corundum; haematite and fire clay deposits in Mirzapur district, gypsum deposits in Dehradun, magnesite deposits in Almora and felspar, quartz and clay deposits in Banada district, might be particularly mentioned in this context. Besides, there are several big deposits of lime-stone, some of which have been found to be of very high purity. The results of about 3-4 years' work done by the State Directorate of Geology and Mining, reveal chances of occurrence of a large number of other minerals in the State. However, for the industrial development of the State, it is essential that all its mineral wealth be well investigated and developed. In the absence of any proper co-ordinating authority in the State, so far, only the District Officers have been concerned with the issue of prospecting licences or mineral leases. There are chances of these licences or leases being, *inter alia*, sanctioned at fixed rates to such parties also as are not interested in the actual utilisation of minerals, thereby according them an unfettered opportunity to exploit the situation. Circles connected with mineral enterprise have also an apprehension that unscrupulous parties often remove minerals from quarries and mines in an unauthorised and unscientific manner. The Directorate of Geology and Mining which is concerned only with the survey of minerals, has no control over the situation.

2. Even some of the available important minerals like corundum are not included in the list prescribing fees for licences and leases for various minerals. As such, the rates charged therefor are for "other minerals", which is very much to the advantage of the licensee and against the financial interest of Government.

3. In the circumstances, in order to ensure proper mineral administration in the State, it is recommended that a Mineral Development Corporation be established which would mainly undertake:

(*i*) Prospecting and proving successful commercial exploitability of mineral deposits.

(*ii*) Mining of minerals under proper leases and prospecting licences.

(*iii*) Setting up of mineral beneficiation plants, where necessary.

(*iv*) Arranging utilisation of minerals for industrial purposes.

4. Recently, the Government of India have set-up a National Mineral Development Corporation which would take up exploitation of minerals in the public sector. As this Corporation is likely to concentrate on minerals of all India importance such as Iron ores, Coal, Manganese etc., there is necessity for the setting up of a Mineral Development Corporation for the State.

5. To start with, the authorised capital of the Corporation may be fixed at Rs. 1 crore. Other details of the scheme may be worked out by an ad-hoc body to be appointed for the purpose.

24. EARMARKING AND DEVELOPMENT OF INDUSTRIAL AREAS AND TECHNO-ECONOMIC SURVEY OF PROSPECTIVE AREAS FOR INDUSTRIAL DEVELOPMENT.

For provision of land to prospective entrepreneurs for large and medium scale industries in the State, and with a view to ensure planned development of such industrial areas, it may be useful to reserve suitable areas of land in different districts. In selecting such areas, due care would have to be taken about the facilities of rail and road transport, provision of water and electric power, easy disposal of effluents and such other facilities as are essential for the location of the industry. The area to be reserved in a particular district would also depend upon its inherent potential for development of industries, taking into consideration the availability of raw materials, marketing facilities and trained labour. Such a step is necessary not only for the facility of the entrepreneurs but also for the planned development of towns.

2. Necessary steps would have to be taken for the earmarking of such areas. In some cases Gram Punchayats may allocate the land and it may then be given on annual lease to the parties concerned. However, some of the intervening land may have to be acquired also. In other cases all the land would have to be acquired. In all cases, apart from the earmarking of the area, some expenditure would have to be incurred on development of the land and provision for essential transport links. All the expenditure on this scheme could, however, be recovered from the parties concerned on allocation of the land to them subsequently on a no-profit-no-loss basis. The land in different districts may be selected by Zonal Industries Officers and District Industries Officers, in consultation with District Magistrates and Town Planners.

3. Similarly, possibilities for industrial development of such areas as have an exploitable potential therefor could be profitably explored through Techno-Economic survey. The eastern districts of the State might be particularly mentioned in this behalf. Some survey work under this scheme could also be carried out to investigate over-all economics of the projects selected for being located in a particular area, before their practical execution. This might involve association of Techno-Economic Experts from outside. The scheme would thus prove to be of immense benefit for the industrial development of prospective areas of the State, as also for practical execution of the projects selected for being located therein.

4. The Government of Uttar Pradesh had lately sent a few of their teams for studying the industrial programmes in other States. According to the report from one of these teams which visited the northern parts of the country, the Punjab Government have already built up a number of industrial areas which are developing very fast to ameliorate the economic and industrial structure of their State. The Bihar State also had a Techno-Economic survey made in respect of its areas. There is no doubt that these schemes would go a long way to promote the industrial development of our State, in a planned manner. The areas under these schemes could be developed as potential industrial areas, where different industries could evenly be concentrated with cumulative advantage to one another.

25. REQUIREMENTS OF RAIL AND ROAD TRANSPORT.

The implementation of the industrial plan as envisaged for the Third Plan period would naturally involve extra rail and road transport, both for the collection of raw materials and the dispersion of finished goods. The additional transport involved varies from industry to industry and no definite formula can be worked out to link the monetary investment with the extra capacity required. Further, some of the industries, such as sugar and to a certain extent oil, require seasonal movement. However, an attempt has been made to work out the movement involved for some of the important industries in the following table:—

Serial no.	Name of the Industry	Annual capacity	Expected investment in crores of Rupees	Total annual movement for raw-materials and finished goods (in thousand tons)	Movement per crore of investment (in thousand tons)
1	Cement Industry	2.3 lac tons per year	3.5	360	100
2	Fire Brick Factory	36,000 tons	0.63	90	130
3	Nitrogenous fertilizer in the form of ammonium sulphate.	3.5 lac tons per year	27	900	33
4	Sugar Factory ..	1,000 tons cane crushing per day.	1.4	240 during 4/5 months	80
5	Paper Factory ..	15,000 tons ..	3.6	100	25
6	Electric Steel furnace	15,000 tons ..	100	40	40

2. From the above table it is clear that although there is wide variation in the annual total tonnage of movement per crore of investment for different industries, yet even taking a very conservative figure, the extra movement involved should not work out to less than 50,000 tons per crore investment. As the total size of the Third Five Year Plan for medium and heavy Industries is expected to be of the order of Rs. 451 crores, based on the above averages the extra annual movement involved is expected to amount to round about 22 million tons. Even if 25% of this movement is taken over by road transport, the extra burden on the railways cannot be expected to be less than 15 to 17 million tons. In order to carry this extra burden, it may be necessary for the railways to increase the capacity of some of the sections, as well as to arrange for the construction of some new rail links. An attempt is being made to work out the load in different sections and also to prepare a list of the new rail links, which may prove essential for the industrial development of the State... It will not be out of place to discuss some of the most important new rail links which are essential for successful implementation of this industrial plan.

(1) *Pipri-Singrauli Coal Field rail link*:—Singrauli coal fields are situated to the south-west of district Mirzapur. Part of it extends in

U.P. and the remaining in Madhya Pradesh. A new railway line is under construction from Robertsgunj to Garhwa road, which will pass through Pipri, to Rihand Dam site. Singrauli coal fields are within 10/12 miles of Pipri and extend upto 50/60 miles west of Pipri. The most important point in these collieries where work is in progress and thick seams have been found out is Naunagarh near Turra Nala. This place is about 25 miles from Pipri. Provision of a rail link from Pipri upto Naunagarh will open the Singrauli coal fields. With the development of Singrauli coal fields, the rate of coal in U.P. will go down on an average by Rs. 5/- per ton as railway haulage of nearly 150 to 175 miles would be saved. The quality of the Singrauli coal as per details given by the Geological Survey and announced in the Parliament is very encouraging. The estimated quantity of these coal deposits is at least 400 million tons and certain seams have been found to be of first grade. These coal fields would be within 125 miles of Chunar as against a distance of nearly 300 miles from Bihar Coal Fields. The area of Singrauli Coal Fields is very vast being about 900 sq. miles as against 600 sq. miles of Jharia and Raniganj coal fields. There are excellent prospects for the supply of coal from Singrauli fields to the whole of U.P., Rajasthan, Punjab, Himachal Pradesh etc. With the development of these coal fields one of the great bottlenecks for the industrial development of U. P. being awav from the coal fields will be solved. The construction of this new rail link is of prime importance for the industrial development of this State. It may be stated that there will be adequate load on this new rail link to make it a commercial proposition.

(2) *Providing of metre gauge line at Naini*:——Naini in district Allahabad is being developed as an important industrial area. More than half a dozen big factories have already been installed there and it is expected that a large number of new factories would come up there in the near future. The metre-gauge line at Allahabad comes upto Rambagh but Naini is not connected by a metre-gauge. For the facilities of movement of raw materials and finished goods, it would be of great advantage if metre gauge is extended upto Naini. The total length of extension will not be more than five miles.

(3) *Provision of rail link between Jeonathpur and Bechepur*:—The triangle between Jeonathpur, Moghalsarai and Bechepur is being developed as an important industrial area. M/s. Sahu Chemicals have already commenced functioning and M/s. Asia Cycles are putting up their factory. M/s. Vibhuti Glass Works are situated about a mile from Jeonathpur. There will be substantial expansion in the capacity of M/s. Sahu Chemicals during the Third Plan period and it is anticipated that a large number of other industries would come up in the Moghalsarai area. The provision of a rail link between Jeonathpur and Bechepur, a distance of nearly 4 or 5 miles would greatly facilitate the setting up of the industrial units. It will also partly eliminate the load on Moghalsarai as wagons can move directly from Bechepur to Jeonathpur.

(4) *Provision of a rail link between Dhak-Pathar and Dehradun*:—Dhak-pathar is at a distance of nearly 30 miles north-east of Dehradun. Most of the forest products come to Dhak-Pathar by floating in Yamuna river. There are vast potentialities for the setting up of different industrial units in this area based on forest products, the important ones being rayon grade pulp, newsprint paper, rosins etc. The provision of a rail link from Dehradun to Dhakpathar would greatly facilitate the development of the forest wealth and various industries based on forest products in the State. There are also good possibilities of suitable quality lime-stone being available in the area which may lead to the establishment of one or two cement factories.

3. As regards road transport, it is understood that P. W. D. of the State, is contemplating to build about 4000 miles of new pucca roads during the Third Plan period. It is understood that linking of industrial areas and also areas having minerals and forest wealth will receive priority. It is recommended that out of 4000 miles, at least 500/700 miles new roads should be allotted for the development of industrial areas. Details of these new road links are being worked out and would be sent to the P. W. D. shortly. It may, however, be mentioned that the following road-links require special attention:—

(*i*) *Pipri-Bansi-Kota road*:—This metalled road, of about 30 miles length, would open up the Singrauli coal-field area as well as the Fire-clay deposits near Bansi. It would assist in implementation of the projects on Refractories, High Tension Insulators, Stoneware Pipes etc., besides giving a fillip to the industries based on utilisation of the vast deposits of coal.

(*ii*) *Road connecting magnesite sites with the main road in Someshwar-Bagheshwar area.*—In order to exploit these deposits commercially, and to implement the project on dead-burnt magnesite, it is essential to construct such a road.

4. The possibilities of river transport have also to be kept in view while working out the details of rail and road links, with a view to reduce avoidable strain on them.

26. LOCATIONAL PATTERN OF VARIOUS INDUSTRIAL PROJECTS.

Fixation of location of an industrial project is dependent on several factors like:

(*i*) Transportation costs on account of localised raw materials--particularly the weight-losing materials, like coal, oil, etc.

(*ii*) Distances from consumption centres.

(*iii*) Costs on labour.

Calculating the weights of all the utilised materials, and the distances to which they are to be brought, as well as the quantities of end-products and the distances of the consuming markets, theoretically speaking, it is possible to give a fairly exact locational figure for every project, which would take into account the proportion of labour cost in the total cost structure of the end-product.

2. In actual practice, many other considerations have to be kept in view.

3. Because of dearth of electric power in the State, the units have been proposed at places where power required could be available with lesser strain on the over-all power resources of the State.

4. Similarly an attempt has been made to keep the units proposed close to the location of raw materials and minerals, so as to cut down avoidable stress on the railway system and to reduce requirements of road links so that these industrial needs do not impinge too heavily on the limited resources of the State in this respect.

5. Again, it is recognised that heavy and large scale industrial units give rise quickly to a group of small and medium scale units around them. Apart from the indirect employment potential, which arises from multiplication of work from supply of raw materials and component parts, there is a huge long-term employment potential in every big unit, for, based on the end-products, co-products and by-products obtained, several other units could be easily established in the vicinity—both in the large scale as well as the small scale sectors.

6. In order that the advantages of increased employment may be evenly spread-out in the State, the units proposed have been kept split-up and dispersed. Even though the size of a unit has to be the optimum one in order that the cost of production may be the lowest, yet wherever (such as in Food & Allied Industries, Oils & Surface Coatings, Leather and Allied Industries and Forest Products) consistent with the nature of economy of the industry, the units could be divided into smaller entities, this has been attempted. It may be mentioned here that in some cases (as in Electrical and Mechanical Engineering Groups) the units shown are assemblage plants, and the different components of the products could be manufactured in small or medium feeder units, each dealing with a particular component part.

7. Thus, the interests of regional development and the desirability of opening new avenues of employment in backward areas of the State have been prominently kept in view in selection of locations for the various industrial projects proposed.

8. The table given in Appendix III indicates area-wise distribution of the proposed industrial units in Uttar Pradesh. It would be found therefrom that eastern districts and the hilly areas of the State have been amply taken care of.

27. INCENTIVES NECESSARY FOR PRIVATE SECTOR.

According to the proposals for the Third Five Year Plan, out of the total allocations amounting to Rs. 451 crores for the large and medium scale industries in the State, the investment in the private sector is estimated to be Rs. 216 crores for producer goods industries and Rs. 50 crores for consumer goods industries. Obviously for all this huge investment, there should be sufficient incentives for private industrialists. Such incentives could be in the form of assistance that might be rendered to the private sector, to enable it to come up to the prescribed allocations. In this context, suitable recommendations are made hereunder:

TECHNICAL ASSISTANCE

2. Three industrial Advisers have been provided under the reorganisation scheme of the Heavy Industries Wing in the Directorate of Industries, U. P. Some technical experts are already available within the Directorate and at the H. B. Technological Institute, Kanpur. Besides, a number of technical experts, scientists and research workers are borne on this Committee also, which is proposed to be made a standing committee. All these resources could be usefully pooled and attached to the Heavy Industries Wing, to render technical assistance in the matters concerning development of large and medium scale industries in the State.

3. The private sector would also avail the benefit of technical advice from the proposed Industrial Research Centre, which would be conducting industrial and technological research and would set up pilot plants in respect of all chemical industries. Similarly, for engineering industries, technical advice is proposed to be made available from the Design-cum-Research Centre to be established at the Government Precision Instruments Factory, Lucknow.

FINANCIAL ASSISTANCE

4. So far, no regular financial institution exists in the State for rendering financial assistance to large scale industries. The U. P. Financial Corporation has lately started entertaining financial requiremets of such industrial units upto a maximum limit of Rs. 10 lacs only. It is understood that this limit is now being raised to Rs. 25 lacs. However, the financial requirements of large scale units generally exceed even this limit, and could not thus be met fully by the Corporation. In the circumstances, large scale units have to approach the Industrial Finance Corporation, Industrial Credit and Investment Corporation etc. for financial assistance. The State Government have no hand in the affairs of these Institutions and as such they could hardly render any useful support to the industrial units in the matter of procurement of financial assistance through these Institutions.

5. In the circumstances, the working of the U. P. Financial Corporation might be re-inforced, so as to accommodate financial requirements of large scale units to a reasonable extent. It is expected that with a provision of a crore of rupees towards its share capital, the U. P. Financial Corporation could be enabled to advance upto Rs. 10 crores to the industry, issuing debentures for raising necessary funds.

6. Taking advantage of the easy money market conditions, the State Government could also float loans to the tune of about Rs. 15 crores in 3-4 instalments spread over a period of five years. The moneys raised could be directly advanced as loans to industries on such rates of interest as would ensure marginal profit to the State, apart from providing much-needed incentive to the private sector.

7. As further aid to private sector, the State Government may provide for bank guarantees, amounting to about Rs. 20 crores, on fulfilment of conditions of adequate security. It is felt that without such well-knit arrangements for financial assistance, the programme allocated for private sector would not be fully carried through and this State would not be able to march ahead even during the III plan, towards its goal of industrial sufficiency. It is understood that such facilities are being contemplated by other states in the country.

ASSISTANCE IN PROCUREMENT OF IMPORTED RAW MATERIALS, MACHINERY, ETC

8. Almost all large scale industrial units are governed by the Industries (Development & Regulation) Act, 1951. According to the existing procedure, the cases for import of raw materials, machinery, etc. by such concerns are dealt with directly by the Government of India. The State Government have no hand in this matter, nor any recommendation from the State Government is obtained by the Government of India in dealing with the cases for import licences and foreign exchange requirements for the import of these articles by the concerned industrial units. The procedure has an inherent draw-back, and it appears necessary that the cases for import of raw materials, machinery etc. by the large scale units should also be routed through the State authorities.

SUPPLY OF POWER

9. Difficulty in the matter of supply of power for industrial purposes, has always been greatly felt. Admittedly, this has been one of the chief reasons why this vast State of ours, which otherwise possesses no insignificant natural resources for intensive development of its industry, could not thus far make a headway at all in this direction. The over-all requirement of power for the Third Plan of the State, for large and medium scale industries is expected to be of the order of 488 MW. Very urgent and adequately effective steps have to be taken to procure the requisite allocation of power, in order to ensure planned development of these industries.

OTHER ITEMS

10. Among other pre-requisites of the private industry, land and suitable transport links deserve special mention. So far as the requirement of land is concerned, the schemes for ear-marking and development of industrial areas and techno-economic survey of prospective areas for industrial development, it is hoped, would meet the same to an appropriate extent. Suitable locations under these schemes may be selected taking into account the availability of land, power, markets, disposal of effluents, drainage, dispersal of units etc.

11. As regards transport links, it would be necessary to provide metalled roads and railways to ensure availability of raw material to nascent and future industrial units, and movement of their products, at economical cost. In this connection, it might be mentioned that while it is contemplated to set up a Mineral Development Corporation for the exploitation of minerals, it would be of importance that suitable links

are put up, as quickly as possible, to transport these raw materials from mines to the factory sites. This matter has already been dealt with in some detail in Chapter 25.

12. It cannot be denied that the private sector have been experiencing difficulty because of procedural delay in the dealing of their various matters at different levels of the administrative machinery. Such delays are greatly detrimental to the interest of industrial development of the State. The most effective way to solve the difficulty is establishment of a high-level Board (like the Industries Development Board) where important decisions about execution of industrial schemes could be taken quickly and effectively.

13. The Liaison Office proposed to be established in Delhi, is likely to prove of great help in obtaining assistance as required from the various offices of the Government of India located in Delhi.

28. NEED FOR STRENGTHENING OF HEAVY INDUSTRIES ORGANISATION.

With the huge planning for development of large and medium industries in the State during the Third Five Year Plan, it would be essential to have a suitable working machinery to undertake the preparatory work for execution of various programmes formulated. It need hardly be mentioned that, as at present constituted, the Heavy Industries Section in the Directorate of Industries could not undertake all this work. It is necessary, therefore, to reorganise and strengthen this set-up by providing requisite technical and ancillary staff, in order to ensure effective results. Accordingly, a modest scheme for reorganisation of the Heavy Industries Wing of the Directorate has been formulated and included in the Third Five year Plan proposals. The scheme mainly envisages establishment of a Development Wing—with its three different sections for specific purposes, an Administrative Wing and a Liaison Office at Delhi. The whole structure is briefly outlined below:—

DEVELOPMENT (A) WING

To deal with entire planning for development and progressive growth of large and medium scale industries in the State, including establishment of new industries; restarting of closed factories; effecting increase in production capacity of existing industries and implementation of various recommendations of the Planning Commission—with particular reference to organisation of Development Councils in regard to important industries functioning in the State.

DEVELOPMENT (B) WING

To deal with Industrial Research and execution of various industrial units in the public sector through the Heavy Industries Corporation or otherwise.

DEVELOPMENT (C) WING

To deal with investigation of minerals, including the schemes to be operated by the Directorate of Geology and Mining, U. P., establishment of Mineral Development Corporation, utilisation and augmentation of other natural resources of the State for industrial development, undertaking of Industrial Areas Scheme and Techno-Economic Survey of prospective areas for industrial development.

ADMINISTRATIVE WING

To deal with various industrial concerns involving financial interests of Government, registration and licensing of industrial undertakings under the Industries (Development & Regulation) Act, 1951, regulation of aids to large and medium scale industries in the State, collection, tabulation and dissemination of industrial and commercial information as regards large and medium scale industries, training of technical personnel etc. (This Wing would also function as a co-ordinating link for the entire Heavy Industries set-up.)

LIAISON OFFICE AT DELHI

To act as an agency of the State Government to be in closest liaison with various departments of Government of India located in Delhi, *viz*: Planning Commission, Development Wing of the Ministry of Commerce and Industry, Ministry of Scientific Research and Cultural Affairs, Ministry of Finance, Directorate General of Supplies and Disposals, Chief Controller of Imports and Exports etc. (It may be mentioned here that not only the entire planning for industrial development of the State has an inevitable co-relation with the over-all industrial plans and policies of the Government of India, but it is also largely dependent upon valuable assistance from the various departments of the Government of India located in Delhi. The proposed liaison office would take care of all these requirements and would also provide a rest-house to accommodate various distinguished visitors, foreign experts and advisers to be associated with the industrial development plans of the State and individual projects thereunder).

2. Details of requirements of Heavy Industries Organisation have been worked out and are given in Appendix II.

3. Altogether, it may be stressed that the scheme envisaging reorganisation and strengthening of the Heavy Industries Wing of the Directorate of Industries, U. P., is *sine-qua-non* for the planning and execution of the entire development programme for large and medium scale industries in the State.

PART—C

CONCLUSIONS—CHIEF CONVENER'S REPORT.

29. CHIEF CONVENER'S REPORT

A REVIEW OF THIRD PLAN PROPOSALS:

The different Working Groups constituted by the Heavy Industries Plan Committee have drawn up a nucleus of development programme for setting up large and medium scale industries in the State, both in the private and public sectors, during the Third Five-Year Plan. The specific projects recommended by the various groups for inclusion in this programme are summarised in *Proforma* 'X', appended at the close of this chapter.

2. The proposals formulated are in respect of new industries or for development of new lines of production in existing industries, utilising such raw materials, recovered by-products and wastes as are available in the State. The priority of projects is mainly determined by import considerations pertaining to articles proposed to be manufactured. Wherever the articles are being purchased from other countries, or wherever the indigenous production is considered insufficient to meet the local demand, the item concerned has been given a high priority.

3. The Working Groups have primarily concerned themselves with the basic industires, *viz.* producer goods industries, though in many cases consumer goods industries have also been taken into consideration by them. Apart from the items dealt with, there are, however, many other large and medium scale industries relating to consumer goods, which would be readily taken up by the private sector. Even in the domain of the producer goods industries, the private sector could be expected to take up a large share. However, wherever the article concerned is provided in schedule 'A' or 'B' of the Industrial Policy Resolution, or where the nature of the goods produced or complexity of technique is such that the private sector may not be interested in its production, the project has been considered for being taken up in the public sector.

TOTAL COST OF THE PROPOSALS:

4. The total cost requirements for projects suggested by the 18 Working Groups, according to the *Proforma* 'X', work out to Rs. 393 crores. To this may be added the estimated cost of the following schemes, which do not relate to any one particular Group and which have been discussed in the preceding chapters:—

	Rs. in crores.
(1) Heavy Industries Corporation (including Govt. investment towards capital structure of industrial enterprises)	3.00
(2) Mineral Development Corporation.	1.00
(3) Organisation for heavy industries.	0.45
(4) Industrial Research.	1.25
(5) Industrial Areas Scheme and Techno-Economic Survey. . .	1.30
(6) Govt. shares in U. P. Financial Corporation. . .	1.00
	Rs. 8.00 crores.

5. The total cost of the projects and schemes may thus be estimated at about Rs. 401 crores.

6. In order to suggest a division of this total programme into various sectors, and to determine the size of the Third Five-Year Plan proposals in the public sector for the State, it may be useful to refer to the proposed outlay and break-up of allocations in the Third Plan of the Government of India. According to first reactions available, it is thought that the Plan would be of the order of Rs. 10,000 to Rs. 11,000 crores, out of which Rs. 3,000 to Rs. 3,500 crores may be allotted for Industries and Mineral Development. The Eastern Economist has estimated the investments for the producer-goods industries as below:—

	Physical Targets	Physical Targets.	Financial outlay
	1960-61.	1961-66.	
Producer-Goods Industries :			
Steel (m. tons) (Ingots)	6	10	800
Cement (m. tons)	10	20	100
Coal (m. tons)	60	120	250
Power (m. K. W.)	6.9	15.0	600
Fertilizers (nitrogen) (m. tons)	0.38	1.5	200
Oil exploration and refining of petroleum products (m. tons) (public sector only).	4.3	9.0	200
Chemicals.	—	—	100
Heavy Machinery.	—	—	200
Other Producer Goods.	—	—	100
			2,550

7. This shows that approximately 2,550 crores of rupees are to be invested in the producer-goods industries.

8. According to latest trends as envisaged from the studies made by the Federation of the Indian Chambers of Commerce and Industry, and the Ooty Seminar of the All India Congress Committee, about 55%-60% of the total investment for the producer-goods industries could be earmarked for the private sector. The outlay for the public sector could thus be taken roughly as Rs. 1,200 crores—of which Rs. 900 crores may be in the Central Plan and Rs. 300 crores in the States Plan. Uttar Pradesh would be entitled to one sixth of this total outlay, on the basis of population—even if no weightage is given on account of the huge leeway which is yet to be made up by this State owing to its backward position in the industrial sphere during the First and Second Plan periods. The figure would thus work out to about Rs. 900 crores÷6=Rs. 150 crores, against which the total cost requirements of the projects proposed to be included in the Central Plan, are of the order of Rs. 138 crores only as detailed in Table 'A' below:

TABLE 'A'

THIRD FIVE YEAR PLAN PROJECTS PROPOSED FOR INCLUSION IN THE CENTRAL PLAN

	Name of the Project.	*Cost in crores of rupees.*
(1)	Antibiotics	10.0
(2)	Nitrogenous Fertilizers	52.0
(3)	Development and Exploitation of Singrauli Coal fields	10.0
(4)	Phyto-chemicals	6.2
(5)	Raw Film and Cellulose Acetate	13.3
(6)	Low Temperature Coal Carbonization	3.0
(7)	Insecticides and Weedicides	2.7
(8)	Electronics Equipment Industry and Electronic Instruments Industry	4.0
(9)	Air-craft sheets and Aluminium ancillaries	1.5
(10)	Ball and Roller Bearings	2.0
(11)	Medium Structurals including cranes	2.0
(12)	Road Rollers and Earth moving equipments	8.0
(13)	Railway coaches and Diesel Cars	9.0
(14)	Electric and Diesel Locomotives	14.0
	Total :	137.7, say 138.

9. The last three items mentioned above may be substituted by such other schemes which may be preferred for establishment by Central Government during the Third Plan period. A lot of emphasis would perhaps have to be laid on the production of machinetools on a large scale in public sector. Thus a machinetools unit, like the HMT, may be set up with advantage in Uttar Pradesh, to cater to the growing needs for machinetools here. Similarly, considering the production of aluminium metal in the State, a unit for manufacture of Civilian Air-crafts, for which there is sufficient scope in the country now, could be established in the southern part of Mirzapur district, which offers a favourable location from the point of view of availability of raw materials as well as from strategical considerations.

10. Considering that during the first two plans, no project worth the name from the Central Plan has been located in U. P., we would perhaps not be deemed over-bearing in asking for this allotment of Rs. 138 crores from the Government of India when we put this figure below the demand justified on the basis of population.

11. A break-up of the schemes which are to be included in the State Plan portion of the public sector is given in Table 'B' hereunder. These investments would amount to about 35 crores of rupees—which would only be 3/5ths of the justifiable allocation for the State.

TABLE 'B'

Third Five Year Plan Projects proposed for the State Plan of the Public Sector

	Name of the Project.	*Cost in crores of rupees.*
(1)	U.P. Government Cement Factory	4.10
(2)	Government Precision Instruments Factory	3.43
(3)	Integrated unit for manufacture of Rayon-grade pulp and Newsprint	10.60
(4)	High and Low Tension Insulators	0.47
(5)	Refractories	0.63
(6)	Dead-burnt Magnesite	0.48
(7)	Food and Allied Industries	1.50
(8)	Silicon Carbide and Graphite Electrodes	2.00
(9)	Spinning unit for superfine yarn	1.53
(10)	Minerals	0.79
(11)	Rosin Distillation	0.50
(12)	Bobbin Manufacture	0.20
(13)	Cultivation of Drugs (50% of the total cost).	0.14
(14)	Sand Washing Plant (First unit)	0.05
(15)	Heavy Industries Corporation (including Govt. investment towards capital structure of industrial enterprises)	3.00
(16)	Mineral Development Corporation	1.00
(17)	Organisation for Heavy Industries	0.45
(18)	Industrial Research	1.25
(19)	Industrial Areas Scheme and Techno-Economic Survey	1.30
(20)	Government shares in U.P. Financial Corporation	1.00
	Total:	**34.42**

(Taking into account the expenditure to be incurred on essential facilities, which may have to be provided to the private sector, the figure could be taken roundly at Rs. 35 crores.)

12. The schemes which are to be taken up in the Co-operative Sector are given in Table 'C' below. The cost requirements of these schemes amount to roughly 12 crores of rupees.

TABLE 'C'

THIRD FIVE YEAR PLAN PROJECTS FOR CO-OPERATIVE SECTOR

Name of the Projects	*Cost in crores of rupees.*
(1) Food and Allied Industries	2.27.
(2) Cultivation of Drugs (50% of the total cost)	0.14
(3) Erection of six new sugar factories	8.50
(4) Spinning Mill for Coarse and Medium Yarn	0.70
(5) Sand Washing Plant (Second unit)	0.05
Total:	11.66, say 12.

13. The remaining amount of Rs. 216 crores would have to be found from the private sector. According to the views of the Federation of the Indian Chambers of Commerce and Industry, about investment in the private sector during the coming Plan, there should be no difficulty, whatsoever, in this behalf. The Eastern Economicst has calculated the investment on consumer goods industries to be about 15% to 20% of the investment on producer goods industries. Thus apart from this amount of Rs. 216 crores for the producer-goods industries, private sector is also expected to invest about Rs. 50 crores for consumer-goods industries in the State during the Third Plan period as against its estimated investment of Rs. 30 crores for these industries during the Second Plan period. The total amount of investment by the private sector for producer as well as consumer-goods industries, would thus be Rs. 266 crores, out of the grand total of Rs. 451 crores (Rs. 401 crores+Rs. 50 crores), *i.e.* roughly about 60% of the total. This would be quite in accordance with the estimates drawn up by the Federation of the Indian Chambers of Commerce and Industry, as indicated above.

14. Table 'D' below shows the proposed allotments for different sectors for the industries in the Third Plan for the State.

TABLE 'D'

PROPOSED DIVISION OF COST OF THE PROJECTS AMONGST DIFFERENT SECTORS

	Cost in crores of rupees.
Producer-goods Industries	
Central Plan	138.00
State Plan	35.00
	173.00

Co-operative Sector	12.00
Private Sector	216.00
	401.00
Private Sector for Consumer-goods Industries	50.00
Total:	451.00

POWER REQUIREMENTS FOR III PLAN:

15. The total power requirements for projects suggested by the 18 Working Groups amount to 425 M. Watts. According to the details given on page 10 in the Programme of Power Development in U. P. during the Third Five Year Plan, prepared by the Electricity Department, the following projects are to receive power from the Rihand Generating system:—

(*a*) Aluminium Factory	55 M.W.
(*b*) Soda Ash Factory at Varanasi	35 M.W.
(c) Churk Cement Factory	5 M.W.
Total:	95 M.W.

The estimated requirements of 425 M. Watts mentioned above are inclusive of these 95 M. Watts.

16. Another 33 M. Watts would be required for the expansion of existing industries during the Third Plan—details whereof have been given in Appendix IV. On the basis of the licences applied for consumer-goods industries during the Second Plan period, the requirements for such units would be 30 M. Watts.

17. To sum up, our requirements of power during the Third Plan work out under broad categories as follows:—

(*i*) Requirements for proposed new undertakings	425 M.W.
(*ii*) Further requirements for existing undertakings	33 M.W.
(*iii*) Estimated requirements for other new undertakings / expansions for large-scale consumer-goods industries	30 M.W.
	488 M.W.

These figures are exclusive of the power requirements which may not be fulfilled during the Second Plan period and may have inevitably to be passed on as spill-over to the Third Plan

18. Thus total additional requirements of power for Heavy Indus-

tries in U.P. during the Third Five Year Plan period (over and above the power consumed at the end of the Second Plan period) are 488 M. Watts.

19. Until such time the projects have been finally selected, it is not possible to indicate the exact yearwise break-up for the proposals as a whole, though such break-up for any individual project is available in the nucleus report of the project. However, as far as power requirements are concerned, if the total load of 488 M. Watts is distributed as below, it may well serve the needs of the proposed industrial programme:—

	1961-62	1962-63	1963-64	1964-65	1965-66
Power requirements in M. Watts.	55	78	95	120	140

20. It is felt that to cater to the growing power needs of the State, western U. P. should have a nuclear power station early in Fourth Plan period which would meet the demand in U. P. as well as in Delhi area.

FOREIGN EXCHANGE:

21. Taking the average of all the projects included in Proforma 'X', the foreign exchange component for a unit comes to about Rs. 0.37 crores which is 34% of the total cost of the unit, averaging to about 1.08 crores. This foreign exchange component includes the non-recurring exchange involved in installation of the plant, obtaining consultation etc., as well as the recurring exchange required for one year—usually the year of full production.

22. As against the above foreign exchange requirements, the annual saving/earning in foreign exchange for a unit, on an average basis, amounts to Rs. 0.38 crores. These annual earnings/savings of foreign exchange are the net figures, arrived at after deducting the recurring foreign exchange involved, if any, in the project. Thus the foreign exchange spent on a unit is earned approximately in one year of its coming in full production, working on the same basis of averages. This manner of treatment has been adopted merely to show that generally speaking the projects selected are such where the country would be substantially benefitted on the foreign exchange score, as a result of the setting up of the units.

23. High priorities have been given to the projects where this ratio of foreign exchange saving/earning to the foreign exchange spent is comparatively high.

24. In many cases, the projects suggested have a good potential for earning foreign exchange for the country. Since our labour costs are not high, provided the units are put up with reasonable technological skill, the end-products in our units would be much cheaper in price as compared to other advanced countries. This is particularly true of machanical engineering, electrical engineering and such other groups where labour cost co-efficient in the total cost is comparatively large. This is the reason that a good market has been established for our sewing machines and diesel engines not only in mid-Asia, but also in countries like West Germany and Yugoslavia.

25. While in peace time, the establishment of heavy industries thus results in saving or earning of valuable foreign exchange, during the

period of a war, unless such units have already been well-established, there is a great danger of collapse of the whole economy of the country, as imports cannot be relied upon. In such times, without a fully-developed industrial base, a country could not stand on its own at all.

EMPLOYMENT POTENTIAL:

26. The total employment potential on account of the projects included in Proforma 'X' works to about .97 lakhs. It may be mentioned here that the above figure indicates only the number of persons to be directly employed and paid for by the units. Apart from this direct employment potential, almost in every case, there is a large indirect employment potential, arising from handling and transport of raw materials, quarrying of minerals, marketing of finished goods etc. Over and above all this, every heavy unit has a tremendous long-term employment potential as its end-products, co-products and byproducts give rise to many new industrial undertakings, in the large and medium as well as the small and cottage sectors.

27. It would thus be observed that development of heavy, large and medium units does not come in the way of growth of small and cottage units. On the other hand, it rather accelerates their multiplication and provides a strong base for stabilizing the industrial structure, generating further employment possibilities, and taking the country towards economic self-sufficiency.

SIZE OF THE PLAN—ITS IMPLEMENTATION:

28. Out of the new units proposed in Proforma 'X', roughly in 20% to 25% cases, either licences have already been granted or applications are pending before the Licensing Committee for licences under the Industries (Development and Regulation) Act. In several other cases, inquiries have been made by interested parties and it is hoped that applications for licences would be coming forth in most of these cases by the end of the Second Five Year Plan or early in III Five Year Plan.

29. Considering that about Rs. 60 crores possibly would be invested in the State by the private sector during the II Plan period, the proposed programme for the private sector for the III Plan is quite capable of achievement, provided:

(*i*) Financial help is made available in the form of loans and bank guarantees through Government, U.P. Financial Corporation and other financial institutions in the manner and to the extent indicated in Chapter 27.

(*ii*) Land and appurtenant facilities about location, disposal of effluents, water etc. are given as per Industrial Areas Schemes proposed.

(*iii*) Facilities about controlled materials, technical guidance, transport links etc., and the incentives for investment are provided as indicated in Chapter 27.

(*iv*) All matters pertaining to establishment of large industries are dealt with by a high-powered Board, so that necessary clearance of points involved could be had quickly and effectively without their progress being clogged up by routine.

(*v*) Above all, power required is adequately provided for in time.

It is well known that 'power is the mother of all industries'. Thus the whole industrial development programme is entirely at the mercy of timely production and supply of power.

30. To the extent facilities are not provided and private capital is not sufficiently attracted, there would be a short-fall in this programme with an inevitably large spill-over of the proposed out-lay on to the Fourth Plan period.

31. For successful implementation of the projects included in the Central Plan, while the initiative and the responsibility would primarily rest with the Government of India, it would be necessary to have a full-fledged, technically equipped organisation in order that the projects, for which raw materials, industrial equipment or other facilities are readily available in U.P., could be suitably brought to the notice of the Government of India for early establishment, in the best interests of the country as a whole. Ofcourse, the related points enumerated in preceding paragraphs would have to be particularly taken care of for these projects.

32. The State Plan for large and medium scale industries for the period 1961-66 envisages an outlay of Rs. 35 crores. It includes, to some extent, the essential expenditure to be incurred in providing the facilities discussed above; in setting up a Mineral Development Corporation to take care of investigation and development of mineral wealth of the State; in making necessary surveys and studies with the help of foreign experts, wherever so needed; in undertaking Industrial Research and Pilot Experiments; and in establishment of a Heavy Industries Corporation to implement the individual schemes.

33. This State Plan must be carried out and executed in full, if a self-generating economy is to be developed early in the State. The country is, as a matter of fact, on the threshold of an industrial revolution, and in order that we are not left behind, our State has to pursue its programme with new vigour to enable it to gain its rightful place in near future.

K. N. SRIVASTAVA, I.A.S.,
Chief Convener, Working Groups,
and Member-Secretary,
Heavy Industries Plan Committee.

STATEMENTS IN PROFORMA 'X'

ELUCIDATIONS AND ASSUMPTIONS IN 'PROFORMA X'

1. Figures given in columns 5 to 11 relate to one unit, unless otherwise specified.

2. Priorities for items given in column 2 are in respect of the new items to be taken up. The items for which the work has already progressed to some extent have been indicated below the demarcation line separately.

3. Names of places in column 4 are indicative merely of areas or localities.

4. The capacity indicated in column 6 refers mostly to the optimum size dictated by technological considerations.

5. The cost mentioned in column 7 is the total of block capital and the working capital provided for the project.

6. By the foreign exchange component of the cost, given in column 8, is meant the non-recurring foreign exchange involved in plant, consultation, etc. added to the recurring foreign exchange for one year, usually the year of full production.

7. In column 9 foreign exchange savings for a particular scheme have been generally computed by first taking 75% of the current price of the product produced annually (so as to arrive at the FOB value) and then deducting the recurring foreign exchange involved for the year of full production.

8. Employment potential given in column 10 refers to the number of persons directly employed and paid for by the unit. Apart from it, almost in every case, there is considerable indirect employment potential, arising from handling and transport of raw materials, quarrying of minerals, marketing of finished goods etc. Over and above all this, every heavy unit has a tremendous long-term employment potential as the end-products, co-products and by-products give rise to many new industrial undertakings.

9. Sector given in column 11 indicates only a preference, taking the relevant factors into account. Any unit proposed in the public sector could be transferred to private sector (if it is not included in Schedule A of Industrial Policy Resolution) if there is such a response. Similarly a unit may have to be taken from private to public sector, if it is a vital industry and no private parties evince interest in the project.

10. Letters L, P, and Q indicated in column 12, denote respectively 'Issue of Licence', 'Pendency of application for licence' and 'Query by an interested party.'

11. The calculations of the cost-benefit ratio are based on the block capital investment of the project.

WORKING GROUP I—'PULP AND PAPER'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production,) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Integrated unit for manufacture of rayon grade pulp and newsprint from fir, spruce and bagasse/pine.	1	Saharanpur, Dhakpather ..	10,000 (5000 KW from power plant provided in the scheme).	Newsprint 45,000 Rayon grade Pulp 15,000	1,060	513	450	1,156	Public ..	PQ
2	(*a*) High grade paper and pulp from Sunn Hemp and Rope Cuttings.	1	Varanasi	2,500	High grade paper 7,500 Pulp 7,500	303	129	170	410	Private/Public	
	(*b*) High grade pulp from Sunn Hemp.	1	Varanasi	1,250	15,000	274	98	125	352	Private/Public	
3	Writing and Printing paper from grasses.	2	(i) Lalkuan .. .. (ii) Eastern Terai	5,000	30,000	735	346	232	450	Private ..	Q

1	2	3	4	5	6	7	8	9	10	11	12
4	Writing paper from bagasse and Sunn Hemp.	2	(i) Gorakhpur, Sardarnagar .. (ii) Golagokarannath.	3,800	16,500	429	255	170	754	Private (Consortium).	QQ
5	Writing and Printing paper from bagasse and other Cellulosic materials.	4	(i) Basti .. .. (ii) Ramkola. (iii) Hargaon. (iv) Mansurpur.	3,125	15,000	363	176	130	528	Private ..	LQQQ
6	Corrugated board from rice and wheat straws.	1	Kicha, Rudrapur, Atarrah (Banda).	700	7,500	119	51	48	273	Private	
7	Grease Proof and Glassine paper from bamboo.	1	Dudhi (Mirzapur) ..	700	3,000	140	60	62	273	Private	
8	Kraft paper from pine ..	1	Rishikesh	1,875	15,000	437	212	208	491	Private	
9	Medium Units for Ordinary Stationery paper from straw, bagasse, waste paper and rag.	8	Kaval Towns and Bareilly, Meerut, Aligarh.	700	3,000	25	..	30	35	Private ..	QQQQ
10	Pulp and paper from twisted pine.	1	Saharanpur	2,000	..	100	..	..	..	Private	L (Continuation Scheme).
11	Straw board, Card board, Mill board and paper board.	3	Simbhauli, Deoband, Kanpur	250		25	..	..	..	Private ..	LLP
			Total ..	55,475	..	6,488					

WORKING GROUP II—'CERAMICS' PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	(*a*) Refractories	1	Pipri ..	1,500	34,000	63	23	32	1,302	Public ..	P (A similar unit has been proposed by Government Cement Factory, Churk in the public sector).
	(*b*) Dead Burnt Magnesite ..	1	Almora District ..	1,000	30,000	48	27	40	850	Public ..	
2	High and Low Tension Insulators.	1	Mirzapur or Banda ..	375	2,400	47	25	15	550	Public ..	PP
3	Sand Washing Plants ..	2	(i) Shankergarh (District Allahabad). (ii) Bargarh (District Banda)	200	30,000	5.5	1.15	..	38	Co-operative/Public.	
4	Cement Factory	1	Dehradun or Rishikesh area	6,000	2,10,000	350	150	..	1,200	Private/Public	
		3	Lucknow/Unnao/Rae Bareli	3,000	60,000	110	50	..	400	Private	
5	Sanitary Ware	1	Between Khurja and Ghaziabad	600	4,000	80	49	26	600	Private	

1	2	3	4	5	6	7	8	9	10	11	12
6	Stone Ware Pipe	2	(i) Banda District .. (ii) Western U. P.	200	10,000	30	5	..	250	Private ..	(A similar unit has been proposed by Government Cement Factory, Churk in the public sector).
7	Manufacture of Borosilicate Glass, Scientific Glass ware, tubings and rods.	2	(i) Naini .. .. (ii) Agra.	900	1800	25	13	17	500	Private	
8	Porcelain Crockery ..	1	Agra	200	1,500	39	12	10	200	Private ..	Q
9	Glass Container-ware ..	2	Ghaziabad	400	10,800	50	30	..	500	Private..	LL
10	Glass shells, bulbs, fluorescent tubes, etc.	4	(i) Firozabad .. .. (ii) Shikohabad. (iii) Agra. (iv) Bahjoi.	150	..	10	..	..	..	Private..	LPPPP
			Total ..	22,675	..	1,218	..	..	..		

WORKING GROUP III—'FERMENTATION INDUSTRIES'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Butyl Alcohol	1	Bara Banki ..	450	1,400	38	16	30	212	Private ..	L
2	Diacetone Alcohol/Acetone ..	1	Bara Banki ..	300	1,100/1400	35	16	20	212	Private ..	L
3	Acetic Acid	3	(i) Muzaffarnagar .. (ii) Deoria. (iii) Basti.	200	1,000	12	8	4	62	Private ..	P
4	Power Alcohol ..	5	Deoria,-Basti, Bara Banki, Pilibhit, Muzaffarnagar.	200	1.5 Million gallons	24	..	would earn foreign exchange	43	Private ..	PP
5	Food Yeast	1	Ghaziabad ..	50	500	6	5	..	12	Private ..	LP
6	Butadiene (Synthetic rubber) ..	1	Bareilly ..	4,000	..	600 (for III Plan)	..	..	..	Private ..	L (Continuation Scheme
7	Citric acid	2	Deoria, Bara Banki	200	..	10	..	..	..	Private ..	PP
8	Rubber products	1	Bareilly ..	500	..	50	..	..	..	Private ..	P
9	Tyres and Tubes	1	Bareilly ..	500	..	60	..	..	..	Private, ..	
			Total ..	7,800	..	965					

WORKING GROUP IV—'PLASTIC AND ALLIED INDUSTRIES'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Utimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Cellulose Acetate Rayon and Cellulose Acetate Plastics.	1	Meerut	4,200	Rayon 1800 Plastics 1,200	670	250	24*	2,200	Public/Private	*Imports have been of this order. They would have been much more if there were no restrictions.
2	Raw Film	1	Narendranagar or Rishikesh ..	4,500	3,000	660	250	288	1,700	Public/Private.	
3	Polythene High Pressure ..	1	Bareilly	1,500	6,000	600	400	62	180	Private ..	Q
4	Polythene Low Pressure ..	1	Gorakhpur District ..	1,000	6,000	400	200	170	180	Private.	
5	Polyvinyl Chloride ..	1	Gorakhpur or Sardarnagar ..	2,000	1,500	50	20	45	230	Private ..	Q
6	Furfural	1	Bareilly	300	3,000	45	12	17	50	Private.	
7	Nylon Filament and Moulding Powder.	1	In any part of U. P. where Maize is available in plenty.	1,000	..	200	..	..	..	Private	P
			Total ..	14,500	..	2,625					

WORKING GROUP V—'HEAVY CHEMICALS AND FERTILIZERS'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
	Nitrogenous Fertilizers										
1	70,000 tons Nitrogen/yr. in the form of Ammonium-Nitrate-Sulphate.	1	Hathras, Mathura, Agra or Sitapur	30,100	2,70,000	2,580	756	1,070	3,168	Public.	
2	70,000 tons Nitrogen/yr. in the form of Urea-cum-Ammonium Sulphate or Nitrophosphate-cum-Calcium Nitrate.	1	Shahganj, Gorakhpur or Chopan	26,000	Nitrophosphate 2,12,000 Calcium Nitrate 1,80,000	2,655	938	1,090	3,345	Public.	
3	50,000 tons Nitrogen/yr. in the form of Urea-cum-Ammonium Chloride-cum-Soda Ash	1	Mughal sara ..	30,000	Urea 55,000 Ammonium Chloride 1,00,000 Soda Ash 1,00,000	2,380	702	1,055	2,940	Private.	

1	2	3	4	5	6	7	8	9	10	11	12
	Phosphatic Fertilizers										
4	Single Superphosphate and Sulphuric Acid.	4	Unnao, Allahabad, Shahgani, Kanpur.	1,000	60,000	85	107	120	184	Private.	
	Heavy Chemicals										
5	Caustic Soda	2	Allahabad, Bareilly ..	3,230	6,600	78	43	40	104	Private	
6	Caustic Soda and Dicalcium Phosphate	1	Sardarnagar	3,270	Caustic Soda 6,600 Dicalcium Phosphate 3,600	91	54	55	181	Private	
7	Stable Bleaching Powder ..	1	Bareilly	100	3,000	10	3	10	50	Private	
8	Calcium Carbide	1	Dehra Dun .. .	3,500	6,000	40	17	25	195	Private	Another unit proposed in Public Sector by Working Group on Government Cement Factory, Churk.
			Total ..	1,03,430		8,252					

WORKING GROUP VI—'FINE CHEMICALS & PHARMACEUTICALS'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/ earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Antibiotics	1	Rishikesh	7,000	295	1,000	230	1,200	2,500	Public	.. Q
2	Phytochemicals	1	Rishikesh	1,500	96	620	80	100	1,200	Public.	
3	Alcohol based chemicals—										
	(i) Direct Utilisation ..	1	Saharanpur	300	3,000	57	25	45	255	Private.	
	(i) Via Acetaldehyde ..	1	Deoria	300	4,000	75	35	50	230	Private	
	(ii) Via Ethylene ..	1	Unnao	300	2,000	40	20	28	175	Private.	
4	Insecticides and Weedicides ..	1	Sardarnagar	600	5,500	275	150	200	350	Public.	
5	Low temperature Coal Carbonization	1	Kanpur	500	3.5 lacs coal carbonized	300	190	..	250	Public.	

1	2	3	4	5	6	7	8	9	10	11	12
6	Synthetic Dyes	1	Mughalsarai	550	50 lacs pounds	350	150	160	200	Private.	
7	Starch and Glucose	1	Etawah	250	33,000	50	16	155	500	Private.	
8	Production of Inorganic chemicals like potassium permanganate, Hydrogen peroxide; Aluminium and Titanium Salts, etc.	4	.. ..	100	..	20		Considerable		Private.	
			Total ..	11,700		2,847					

WORKING GROUP VII—'OILS AND SURFACE COATING'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power require ment for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/ earning of foreign exchange (in lacs of Rs.)	Employ-ment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Fatty acids, fatty chemicals and Synthetic detergents.	1	Kanpur	400	1.500	100	51.5 (Mostly recurring)	10	100	Private.	
2	Printing inks	2	Kanpur, Allahabad, Lucknow, Varanasi.	20	300	5	4.6 (Mostly recurring)	4	75	Private.	
3	Paints, Varnishes and Pigments	3	Varanasi, Allahabad, Kanpur, Bareilly.	75	Paints 500 tons Varnishes 1.5 lac gallons. Distemper and Dry colours 200 tons.	22	4.5	7.5	130	Private.	

1	2	3	4	5	6	7	8	9	10	11	12
4	Solvent Extraction of oils	3	Lucknow, Kanpur, Agra, Modinagar.	125	15,000 oil cakes processed	23	3	30	370	Private	LL
5	Synthetic Resins	2	Kanpur, Modinagar ..	20	600	6.5	6.5 (Mostly recurring)	11	60	Private ..	LL
6	Extraction of rice bran oil	1	Bahraich	25	3,000 tons bran processed.	8	2	7.5	190	Private (Consortium).	
7	Production of animal fat (Tallow)	2	Kanpur, Agra, Meerut, Aligarh	20	750	5	Nil	10	50	Private (Consortium).	
8	Oils, Oil Products and hydrogenation units.	6	Hargaon, Kanpur, Modinagar, Agra, Etah, etc.	80	..	10	..	..	..	Private ..	LPPPPP
9	Essential oils	2	Kanpur, Aligarh, Farrukhabad	25	..	8	..	..	..	Private ..	P
			Total ..	1,675	..	352					

WORKING GROUP VIII—'FOOD & ALLIED INDUSTRIES'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Manufacture of Fruited Cereals,	4	(i) Phoolbagh (district Naini Tal)	57	321	38.5	2.4	Earning 10	213	Public.	
	Strained baby foods, etc.		(ii) Lucknow.							Private.	
			(iii) Saharanpur.							Private.	
			(iv) Haldwani.							Private.	
2	Dehydration Units ..	5	(i) Phoolbagh	90	1,290	70.5	..	..	350	Public.	
			(ii) Etawah.							Private/Co-operative	
			(iii) Allahabad.							Do.	
			(iv) Faizabad.							Do.	
			(v) Bareilly.							Do.	
3	Pulping Units	20	Throughout Uttar Pradesh ..	25	900	13	..	..	220	Co-operative.	
4	Papain and Pectin Units ..	5	(i) Basti	50	37.5	30	..	Earning	300	Co-operative.	
			(ii) Allahabad.					10		Do.	

1	2	3	4	5	6	7	8	9	10	11	12
			(iii) Gorakhpur.					Saving		Co-operative	
			(iv) Saharanpur.					5		Do.	
			(v) Phoolbagh.							Public.	
5	Subsidiary foods (Macaroni products).	2	(i) Basti ..	..	400	21	..	..	..	Public.	
			(ii) Bareilly.							Public.	
6	Multipurpose foods (High proteins foods).	4	(i) Etah ..	..	8,000	104	..	..	..	Public.	
			(ii) Gorakhpur.							Do.	
			(iii) Lakhimpur.							Do.	
			(iv) Hardoi.							Do.	
7	Organisation for better utilisation of subsidiary food	..	..	..	..	5	..	..	...	..	
8	Bottling units for fruit beverages.	4	(i) Kanpur ..	60	3,200	40	2	..	100	Private.	
			(ii) Ghaziabad.							Do.	
			(iii) Gorakhpur.							Do.	
			(iv) Varanasi.							Do.	
9	Canning Units (fruits and vegetables).	5	(i) Haldwani ..	82	1,930	45.4		Earning 20	214	Private.	
			(ii) Bareilly.							Do.	
			(iii) Allahabad.							Do.	
			(iv) Saharanpur.							Do.	
			(v) Varanasi.							Do.	

1	2	3	4	5	6	7	8	9	10	11	12
10	Fish Canning Units ..	4	(i) Agra	40	400	20	..	..	160	Private.	
			(ii) Basti.							Do.	
			(iii) Varanasi.							Do.	
			(iv) Phooblagh.							Do.	
11	Cold Storage Units ..	16	(i) Farrukhabad ..	640	16,000 Storage capacity	48	6.4	..	160	All private.	
			(ii) Badaun.								
			(iii) Varanasi.								
			(iv) Bareilly.								
			(v) Moradabad.								
			(vi) Haldwani.								
			(vii) Bhowali.								
			(viii) Kotdwara.								
			(ix) Bulandshahr.								
			(x) Dehra Dun.								
			(xi) Agra.								
			(xii) Etah.								
			(xiii) Lucknow.								
			(xiv) Basti.								
			(xv) Faizabad.								
			(xvi) Gorakhpur.								

1	2	3	4	5	6	7	8	9	10	11	12
12	Cheese factories	2	(i) Mathura .. (ii) Hill region.	..	5.7 lac lbs. of cheese.	37.2	1	30	500	Public Co-operative.	Included by Dairy Development Group in its plan.
13	Milk Powder Factory ..	1	Allahabad ..	..	2,000	35	6	..	100	Co-operative ..	Do.
14	Rural Creameries	2	(i) Moradabad .. (ii) Etawah.	..	3,000	53.9	6	..	1,054	Public Cooperative.	Do.
15	Milk Food and Malted food ..	3	(i) Aligarh .. (ii) Etah. (iii) Ghaziabad	450	..	180	..	..	..	Private .. Private. Private.	LLP
			Total ..	1,494	..	741.5					

N.B.—(i) Figures from columns 5 to 11 relate to all the units.

(ii) Items 3 and 11 rightly belong to small sector. They have, however, been included as they are necessary adjuncts to the units shown above.

WORKING GROUP IX—'ELECTRICAL ENGINEERING'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/ earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Electronic Instruments Industry	1	Any university town ..	200	24,000 pieces consisting of P.H. Meters, colour meters, Oscillo—graphs, Volt meters, Amplifiers, Scalers, High voltage power suppliers etc. Produciton worth Rs. 240 lacs/yr.	102	28	180	500	Public.	
2	Manufacture of components for Electronics Industry	1	Any University town (Preferably same as for item (1)	400	A. Conventional Eletronic components	138	72.5	115	540	Private,	

1	2	3	4	5	6	7	8	9	10	11	12
	Manufacture of Components for Electronics Industry—(*contd.*)				(*i*) *Capacitors* :						
					(*a*) Ceramic Capacitors.						
					(*b*) Paper Capacitors.						
					(*c*) Mica Capacitors.						
					(*d*) Electrolytic Capacitors.						
					(*e*) Vacuum Capacitors.						
					(*f*) Variable Air Dielectric Capacitors.						
					(*g*) Ferrite Capacitors.						
					(*ii*) *Resisters* :						
					(*a*) Carbon Resisters.						
					(*b*) Wire Wound Resisters.						

1	2	3	4	5	6	7	8	9	10	11	12
	Manufacture of Components for Electronics Industry—(*contd.*)				(*c*) Volume Controls.						
					(*d*) High Voltage Resisters.						
					(*iii*) *Inductors* :						
					(*a*) R. F., I. F. and A. F. Transformers of all types with air core and fertile core.						
					(*iv*) *Auxiliaries* :						
					(*a*) Relays.						
					(*b*) Quartz Crystals.						
					(*c*) Condensers for A. C. Fan.						
					(*d*) Chokes.						
					(*v*) A—Printed Circuits for Receivers, Amplifiers, etc.						

1	2	3	4	5	6	7	8	9	10	11	12
	Manufacture of components for Electronics Industry—(*contd.*)				B—*Materials* : Ferrite cores and Laminations. (*vi*) *Transisters* : (*a*) Junction Diodes for radio frequency. (*b*) Junction Diodes for high voltage rectifiers. (*c*) Transistors (Junction as well as point contact.) (*d*) Power transistors. (*e*) Special type of transistors like photo transistors. (Production Rs.1.5 crores/yr.)						

1	2	3	4	5	6	7	8	9	10	11	12
3	Electrical Measuring Instruments.	1	Lucknow or Naini (Allahabad)	600	Nos. Voltmeters 6,000 Ammeters 15,000 Power Factor meters. 600 Frequency meters. 500 Watt meters 600 Synchroscopes. 600 Leakage Indicators 500 Battery meters. 300 *Portable Instruments* Nos. Voltmeters 1,000 Ammeters Combined. 2,000 Voltmeters and ammeters. 2,000	150	42	73	860	Private.	

1	2	3	4	5	6	7	8	9	10	11	12
	Electrical Measuring Instrument —(*contd.*)				Earth Continuity Testers. 500						
					Meggars 3,000						
					Link Testing Ammeters. } 1,000						
					Phaserotation Indicators. 500						
					Voltage and Current Transformers						
					Voltage Transformers (Switch Board type)						
					Nos.						
					3.3 KV 600						
					6.6 KV 1,000						
					11 KV 2,000						
					Current Transformers						
					(Bushing type)						
					Nos.						
					33 KV 1,000						

1	2	3	4	5	6	7	8	9	10	11	12
	Electrical Measuring Instruments—(*contd.*)				66 KV 400 Production Rs.100 lacs/yr.						
4	**Aluminium Cable Industry**	1	Mirzapur ..	4,000	500 miles paper insulated cable and 50 lacs yds. of all other sizes.	250	82.0	238	1,550	Private.	
5	Electronics Equipment Industry	1	Any University town	2,000	Production worth Rs. 400 lacs/yr. Production of Electronic equipment including Broadcasting, tape recording, Dictaphones, Loudspeakers, Cinemascopic units and Thermionic valves, etc.	299	120	300	1,850	Public.	
6	A. C. S. R. Conductors ..	1	Allahabad ..	1,000	..	30	..	..	..	..	
7	Transformers, Switchgears, electric motors, Electro-deposition units and other accessories.	5	Meerut, Moradabad, Varanasi, Aligarh.	500	..	15	..	..	..	..	
			Total ..	10,700	..	1,044					

WORKING GROUP X—'MECHANICAL ENGINEERING'

PROFORMA 'X'

Seria no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in lacs of Rs.)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Machine Tools ..	.. 4	Any where in U. P. ..	600	150	100	62.5	75	625	Private.	
2	Printing Machinery ..	1	Allahabad	2,500	45.5	108	60	45	550	Do.	
3	Wire Ropes including wire drawing,	1	Moghalsarai Region ..	1,500	200	175	70	50	800	Do.	
4	Sugar Machinery	1	Kanpur/Gorakhpur ..	3,000	300	250	100	75	1,000	Do.	
5	Paper Making Machinery ..	1	Any where in U. P. ..	2,500	115	100	40	50	500	Do.	
6	Ball and Roller Bearing ..	1	Ditto ..	2,000	250	200	100	100	800	Public.	
7	Medium Structurals, including cranes.	1	Ditto ..	2,000	250	200	50	75	800	Do.	
8	Grinding Wheels	1	Ditto ..	5,000	75	50	20	15	200	Private.	

1	2	3	4	5	6	7	8	9	10	11	12
9	Scooters and Auto-Rickshaws. (including Small I. C. Engines of 1—5 HP capacity).	1	Any where in U. P. ..	1,000	300	200	80	75	600	Private	
10	Power driven Pumps ..	3	Ditto ..	1,500	58	50	17	25	200	Do.	
11	Automobile Ancillaries ..	1	Ditto ..	2,000	75	60	30	25	300	Do.	
12	Domestic and Air Compressors	1	Ditto ..	2,000	250	200	70	100	800	Do.	
13	Establishment of Tool Room Workshop.	4	Ditto ..	500	50	40	20	13	200	Do.	
14	Clocks and Watches ..	1	Dehra Dun ..	500	120	100	70	50	500	Do.	
15	Railway Equipment Parts ..	1	Any where in U. P. ..	1,000	60	50	15	20	200	Do.	
16	Road Rollers and Earth Moving Equipment.	1	Ditto ..	2,500	1,000	800	300	300	3,000	Public.	
17	Railway Coaches and Diesel Cars	1	Ditto ..	3,500	1,000	900	400	400	4,000	Do.	
18	Transmission Chains	1	Ditto ..	600	60	50	15	10	250	Private.	
19	Electric and Diesel Locomotives	1	Ditto ..	6,000	2,000	1,400	700	600	5,000	Public.	
20	Dash Board Instruments	1	Ditto ..	1,200	..	100	..	..			
			Total ..	47,700	..	5,653					

WORKING GROUP XI—'METALLURGICAL INDUSTRIES' PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/ earning of foreign exchange (in lacs of Rs.)	Employ-ment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	*Electrical Furnace Units*—										
	(*a*) 2 Furnaces of 5 ton each and two 5 ton cupola, grey Iron Foundry with a Forging shop.	1	Meerut ..	5,000	15,000	109.3	42.7	40	800	Private	P 23
	(*b*) Do. but with a steel foundry and without the forging.	1	Agra ..	5,000	15,000	89.5	18.5	40	550	Private.	
	(*c*) Do. but with a steel foundry and a forging shop.	1	Gorakhpur ..	5,000	15,000	100	19.5	40	770	Do.	

1	2	3	4	5	6	7	8	9	10	11	12
	(*d*) Two 5 ton cap. furnaces for making stainless steel (Nickel-free) including a rolling mill and a steel foundry.	1	Bareilly ..	6,000	10,000	150	34	350	300	Private	
	(*e*) Two 12 ton electric furnaces with a Merchant-cum-Billet Mill for making steel ingots, Billets and rods.	1	..	13,000	38,000	200	65	..	120	Do.	Would save foreign exchange indirectly.
	(*f*) One 5 ton Electric furnace for making Ferro Silicon.	1	Mirzapur	2,500	5,000	20	8	20	100	Do.	
2	*Spun Pipe*—										
	(*a*) Cupola, (*b*) Spinning Machine and (*c*) Ancillary Furnace.	1	Mirzapur ..	500	15,000	40	18	..	220	Do.	No foreign exchange is expected as this commodity is not imported although there is very great shortage of it in the country.

1	2	3	4	5	6	7	8	9	10	11	12
3	*Rolling of Brass and Phosphor Bronze.*	1	Mirzapur ..	1,500	2,500	35	8	12.5	200	Private	
	(Both commercial and industrial sheets and strips)— (*a*) Induction furnace and (*b*) Rolling mills.										
4	*Extrusion Plant for*—										
	(*a*) Aluminium and its alloys as well as for Brass and copper tubes.	1	Rihand area ..	1,200	2,500	62.6	29	..	263	Do.	Finished product is imported. It would save foreign exchange to that extent.
	(*b*) Aluminium alloy foundry forging shop and Heat treatment unit.	1	Do. ..	..	3,500						
5	*Manufacture of Rolls*—										
	(*a*) Cupola, (*b*) Air Furnace and (*c*) Roll twining shop.	1	Mirzapur ..	1,000	5,000	30	12	40	235	Private	

1	2	3	4	5	6	7	8	9	10	11	12
6	*Manufacture of*—										
	(*a*) Silion carbide ..	1	Mirzapur	10,000	1,500	200	120	50	250	Public.	
	(*b*) Graphite electrodes ..	1	Do.		2500						
7	Nickel-Chrome wir drawing ..	1	Any one of the industrial estates	100	250	5	..	2.5		Private.	
8	Aluminium from Bauxite ..	1	Mirzapur ..	55,000 (from Rihand system)	..	600	..	..	..	..	Continuation scheme.
9	Aircraft sheets and Aluminium Ancillaries.	1	Chopan area	6,000	..	150	..	..	..	Public.	
10	M. S. Strips and Rivets ..	1	Kanpur	500	..	40	..	..			P
11	Non-Ferrous Metal alloys ..	2	Meerut, Hathras ..	500	..	20	..	..	..		PP
			Total ..	1,13.300		1,871.4	..	..	..		

WORKING GROUP XII—'MINERALS'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Investigation of fire-clay and raw materials for Ceramic Industry.	..	Mirzapur, Jhansi and Banda	..	..	7.20	1.57	..	25	Public.	
2	Investigation of lime-stone, marble and Calcite.	..	Mirzapur, Dehra Dun and Garhwal.	..	..	11.76	2.51	..	32	Do.	
3	Investigation of marls	..	Lucknow, Rae Bareli, Sultanpur and Unnao.	..	..	3.18	..	..	10	Do.	
4	Investigation of gypsum	..	Tehri-Garhwal, Pauri Garhwal, Naini Tal.	..	..	6.63	1.60	..	15	Do.	
5	Investigation of magnesite	..	Almora ..	..	..	8.80	2.18	..	21	Do.	
6	Investigation of Copper	..	Do. ..	..	..	17.80	6.50	..	26	Do.	In collaboration with the Geological Survey of India.

1	2	3	4	5	6	7	8	9	10	11	12
7	Expansion of Geo-Chemical laboratories.	..	Lucknow ..	50	..	3.90	0.25	..	12	Public	
8	A. Pilot Plant study of minerals	..	Kanpur or Lucknow ..	25	..	19.25	3.00	..	33	Do.	
	B. Scheme for exploitation of minerals in ores not rich in them by floatation.	..	Lucknow University ..	..	..	0.80	0.25			Do.	
9	Development and Exploitation of Singrauli coal fields.	..	Mirzapur (U. P.) and Singrauli (M. P.).	..	..	1,000	..	..	..	Do.	To be carried out by the National Coal Development Corporation.
			Total ..	75	..	1079.32	..	..	..		

WORKING GROUP XIII—'LEATHER AND ALLIED INDUSTRIES'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Glace kids	2	(i) Kanpur .. .. (ii) Agra.	100	7.75 lac goat skins.	60	6	Would earn foreign exchange.	367	Private.	
2	Glue, Edible gelatine and Photographic gelatine.	1	Central or Eastern U. P. ..	100	1,200	14	4.45	Do.	108	Do. ..	Q
3	Leather Board ..	2	(i) Kanpur .. .. (ii) Agra.	100	600	14	4.4	Do.	105	Do.	
4	Hydraulic Leather ..	1	Central or Eastern U. P. ..	100	300	24	9.2	Do.	51	Do.	
5	Fancy leather	1	Ditto ..	100	18 lac Sq. ft.	12	3	..	80	Do.	
6	Upholstery leather.. ..	1	Ditto ..	100	7.5 lac Sq. ft.	5.5	2	Would earn foreign exchange 2	55	Do.	
7	Shoe grindery ..	2	(i) Agra .. .. (ii) Kanpur.	10	(1) 1.5 lacs lbs. tingals. (2) 300 lac shoe eyelets. (3) 0.36 lac lbs. Brass screw wire	15	5		68	Do. ..	P
8	Manufacture of Industrial leather.	1	Central or Eastern U, P..	150		50					I
			Total ..	970		283.5					

WORKING GROUP XIV—'FOREST PRODUCTS'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any
1	2	3	4	5	6	7	8	9	10	11	12
1	Rosin Distillation ..	1	Bareilly	..	7,400 tons.	50	..	..	200	Public ..	(Through Expansion Programme).
2	Bobbin Manufacture ..	1	Do.	..	..	20	..	..	100	Do. ..	Restarting.
3	Cultivation of drugs ..	..	Kumaon Division and Tehri Circle.	..	Cultivation over 18,000 acres in 5 years.	28	..	Would indirectly save foreign exchange	2,000	Co-operative/Private/Public.	
4	Hard board from Salai wood ..	2	(a) Dudhi (Mirzapur) (b) Kotdwara (Bijnore). ..	1,000	12,000 tons.	103	30	..	200	Private	
5	Plywood factory	1	Dehra Dun, Mirzapur ..	500	25 lac Sq. ft.	25	..	..	..	Private.	
6	Particle Board, Fibre Board and Chip Board.	1	Bareilly	250	7,200 tons.	25	10	..	..	Do.	LP
			Total ..	2,750	..	354	..	..	..		

WORKING GROUP XV—'SUGAR INDUSTRY'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any.
1	2	3	4	5	6	7	8	9	10	11	12
1	Erection of new Sugar factories	6	Varanasi, Banda, Azamgarh, Pilibhit, Farrukhabad, Aligarh Muzaffarnagar, Meerut, Bulandshahr, Bijnor.	900	80,000	850	120	..	3,600	Co-operative or private if suitable party be forthcoming in suitable parts of the State.	The Selection of site for Co-operative Sugar factories is the sole jurisdiction of the High Power committee appointed by the Government for the purpose.
2	Expansion of the plants of the existing units.	30	List to be drawn up later ..	..	2,20,000	1,200	225	..	..	Private	P 31
3	Shifting of the Sugar factories from congested areas to more suitable areas.	5	Units to be shifted from the districts of Rampur, Basti, Deoria and Gonda.	..	50,000	150	..	..	..	Do.	
			Total ..	900	..	2,200	..	..	..		

N.B.—Figures from columns 5 to 11 relate to all the units.

WORKING GROUP XVI—'TEXTILE INDUSTRY'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any.
1	2	3	4	5	6	7	8	9	10	11	12
1	Reopening and Rehabilitation of closed textile units, with 2,400 automatic looms.	9	Existing locations ..	10,500	50,000 bales of yarn and 57,000 bales of cloth	1,575	510	..	5,500	Private ..	2 shifts.
2	Spinning Mill for superfine yarn	1	Mau (Azamgarh) or Sahaganj or Jhansi.	1,000	3,500 bales	153	48	Earning 18	613	Private/Public	Do.
3	Replacement in working units of 7,600 plain looms with automatic looms.	14	Existing locations ..	No Additional power will be required.	1,82,000 bales	530	190	..	1,500	Private ..	Do
4	Setting up units for weaving of acetate and union fabrics.	2	Tanda (Faizabad), Varanasi ..	6,000	10,000 bales	234	8.4	..	740	Do ..	Do. L
5	Manufacture of Textile Machinery.	1	Meerut	350	30 Sizing machines or other machineries with same equipment.	79·5	52.06	32 (Saving)	250	Do ..	Do.

1	2	3	4	5	6	7	8	9	10	11	12
6	Woollen Mill for carpet yarn ..	1	Mirzapur or Bhadoi ..	150	Worth Rs. 10 lacs to 12 lacs	30	16·5	would earn foreign exchange	Continuity and expansion of employment of the cottage workers engaged in the carpet industry.	Private (A consortium.)	Two shifts
7	Spinning Mill for coarse and Medium Yarn.	1	Etawah	600	12,000 spindles	70	20	..	850	Co-operative	I.
			Total ..	18,600	..	2671.5	..	..	..		

N.B.—Figures given in columns 5 to 11 relate to all the units.

WORKING GROUP XVII—'GOVT. PRECISION INSTRUMENTS FACTORY'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any.
1	2	3	4	5	6	7	8	9	10	11	12
1	Organisation for Instrumentation Industry.	1	Lucknow ..	10	..	4.03	..	..	46	Public.	
2	Research-cum-Development Centre.	1	Do. ..	100	..	20.17	7.29	..	31	Public.	
3	*Mechanical Instruments*—										
	(i) Water meter and Venturi meters	1	Do. ..	70	36,000	61.00	10.60	25.7	372	Do.	
	(ii) Pressure gauges ..	1	Do. ..	30	12,000						
	(iii) Tachographs ..	1	Do. ..	10	500						
	(iv) Petrol meters ..	1	Do. ..	10	500						
	(v) Wall clocks and Time Pieces.	1	Do. ..	30	12,000						

1	2	3	4	5	6	7	8	9	10	11	12
4	*Optical Instruments* :										
	(i) Microscopes ..	1	Lucknow	15	300	88.39	11.00	19.3	440	Public	
	(ii) Movie Cameras ..	1	Do.	15	150						
	(iii) Precision Optical Instruments, *e.g.*, Phase contrast equipment, Prism-Magnifiers, Heating and Cooling Microscope stage, Microtomes, Cinema Projectors etc.	1	Do	170	2,550						
	(iv) Grinding equipment for lenses.	1	Dehra Dun	5	..						
5	*Electrical Measuring Instruments*:										
	(i) Stationary Instruments	1	Lucknow	300	20,500	168.87	39.20	49.5	765	Do.	A similar unit has been proposed by the Electrical Engineering Group in the Private Sector.
	(ii) Portable Instruments	1	Do. ..	200	9,000						
	(iii) Instrument Transformers and high degree instruments.	1	Do ..	100	4,350						
			Total ..	1,065	..	342.96	..	..	..		

WORKING GROUP XVIII—'GOVERNMENT CEMENT FACTORY'

PROFORMA 'X'

Serial no.	Items to be taken up in III Plan in order of priority	No. of units	Tentative locations	Approximate power requirement for a unit (in KWS)	Capacity (annual production) of the unit (in tons)	Total approximate cost of the project (in lacs of Rs.)	Foreign exchange component of the cost (in lacs of Rs.)	Ultimate annual saving/earning of foreign exchange (in lacs of Rs.)	Employment potential (Direct)	Sector preferred	Remarks, if any.
1	2	3	4	5	6	7	8	9	10	11	12
1	Refractories Plant (Firebricks, Sillimanite and Silica bricks).	1	Churk (Mirzapur) ..	1,000	36,000	100	30	20	425	Public.	
2	Prestressed concrete pipes and other cement based products.	1	Churk	300	24,000	75	30	30	250	Do.	
3	White cement	1	Do.	300	6,000	15	4	10	50	Do.	
4	Calcium Carbide	1	Churk or Kotah ..	3,500	6,000	100	51	39	300	Do.	
5	Stone-ware pipes and other products.	1	Churk or Robertsganj ..	300	6,000	50	20		200	Do.	
6	High Alumina Cement ..	1	Churk	300	6,300	20	10	10	50	Do.	
7	Steel Alloys, castings and forgings.	1	Do.	4,000	6,000	50	25	20	700	Do.	
			Total ..	9,700	..	410	..	..	..		

30. SUMMARY OF MAIN RECOMMENDATIONS.

1. To assist the State Government in the execution of their various programmes for industrial development, the Heavy Industries Plan Committee should be made a Standing Committee.

2. The large and medium scale industries selected by Working Groups for being taken up in the Third Five Year Plan are given in Proforma X, at the end of chapter 29. The industries which have been deferred to subsequent plan periods have been mentioned in the respective summary reports, in chapters 1 to 18.

3. For dealing with applied and industrial research, a separate committee should be formed which may be named as Industrial Research Committee. .. **(19.1)**

4. The existing resources of the H.B Technological Institute, Kanpur, should be profitably utilised for industrial and technological research. .. **(19.2)**

5. Pilot plants should be set up for arranging trials of manufacturing processes in order to ascertain industrial potential in each case. The laboratory for pilot plants should be started as an adjunct to the above research centre. .. **(19.4)**

6. The following functions should be entrusted to proposed Industrial Research Centre:—

(*i*) Applied and Industrial research—to serve the industry in the State, both in the public and private sectors.

(*ii*) Fundamental Research in Applied Microbiology, Fermentation Technology and Oil Technology.

(*iii*) Pilot plants laboratory for making semi-industrial trials to prove commercial exploitability of various processes.

(*iv*) Continuance of testing work as being carried out at present. .. **(19.5)**

7. A full-fledged Design-cum-Research centre should be set up for engineering industries, where prototypes of tools and instruments could be devised, designed and then produced on a pilot plant scale before taking up the scheme on commercial basis. .. **(20.1)**

8. The Government Precision Instruments Factory, Lucknow, should be developed into a centre for instrumentation to take care of a large variety of instruments industries. .. **(20.2)**

9. The proposed Design-cum-Research Centre should be

established at the Government Precision Instruments Factory. The centre should be financed through a separate budget grant so as not to burden the commercial working of the Factory. (20.3)

10. To start with, the centre should be designed to have the following structure with requisite equipment and working personnel:

(*i*) Laboratory and Research Section.
(*ii*) Design Section (including Drawing Section).
(*iii*) Workshop (for manufacturing prototypes).
(*iv*) Testing Section (for prototypes).
(*v*) Toolroom (for manufacture of tools, dies, jigs and fixtures). .. (20.4)

11. To augment the resources of technical man-power, particularly for post graduate stages, the following post-graduate courses may be started at the institutions specified:—

(*i*) *H. B. Technological Institute, Kanpur.*

(*a*) Cellulose Technology .. (21.1)
(*b*) High Polymers .. (21.2)
(*c*) Catalysis and Reaction Kinetics .. (21.4)
(*d*) Silicate Technology .. (21.5)
(*e*) Oils and Paints Engineering .. (21.8)
(*f*) Essential Oil Technology .. (21.8)
(*g*) Food Technology .. (21.9)

(*ii*) *Indian Institute of Technology, Kanpur.*

(*a*) Heavy Chemicals Technology .. (21.6)
(*b*) Petroleum Technology .. (21.8)
(*c*) Electrical Design Technology .. (21.12)
(*d*) Electronics .. (21.12)
(*e*) Transisters .. (21.12)
(*f*) Electrical Instruments .. (21.12)
(*g*) Instrumentation .. (21.13)
(*h*) Metallurgy .. (21.14)
(*i*) Aerodynamics .. (21.14)
(*j*) Air-craft Engineering .. (21.14)
(*k*) Internal Combustion Engine .. (21.14)
(*l*) Forging, foundry and automobile engineering .. (21.14)
(*m*) Refrigeration Engineering .. (21.14)

(*iii*) *Banaras Hindu University, Varanasi.*

(*a*) Silicate Technology .. (21.15)
(*b*) Fine Chemicals and Pharmaceuticals .. (21.7)

(*c*) Dye stuffs and Intermediaries .. (21.7)

(*d*) Electronics .. (21.12)

(*e*) Instrumentation .. (21.13)

(*iv*) *Forest Research Institute, Dehradun*

Wood Technology .. (21.10)

(*v*) *Government Central Textile Institute, Kanpur.*

Textile Chemistry and Textile Technology .. (21.16)

(*vi*) *Roorkee University.*

(*a*) Power system and stability .. (21.12)

(b) High voltage engineering .. (21.12)

(c) Servo-mechanism and control .. (21.12)

12. A Heavy Industries Corporation should be established in Uttar Pradesh to undertake implementation of the various industrial projects in the State Sector. (22.1 to 5)

13. In order to ensure proper mineral administration in the State, a Mineral Development Corporation should be established. (23.1 to 5)

14. With a view to ensure planned development of industrial areas, suitable areas of land should be reserved in different districts for establishing large and medium scale industries, providing therefor necessary facilities regarding transport, power, water etc. .. (24.1)

15. Techno-economic Survey of prospective areas for industrial development should be carried out. (24.3)

16. The railways should increase their capacity to transport an extra load of 15 to 17 million tons as a result of increased industrial activity during the Third Plan period. (25.2)

17. The following rail links should be provided during the Third Five Year Plan for the development of Industries:—

(*i*) From Pipri to Naunagarh .. (25.2-1)

(*ii*) Metre guage line at Naini (District Allahabad) .. (25.2-2)

(*iii*) Between Jeonathpur and Bechepur .. (25.2-3)

(*iv*) Between Dhakpathar and Dehradun .. (25.2-4)

18. At least 500/700 miles new roads should be constructed by the P.W.D. for the development of industrial areas in the State. Particular attention is to be given to Pipri-Kota and Bageshwar area roads. (25.3)

19. For providing financial assistance to the heavy and medium scale industries, the U.P. Financial Corporation should be reinforced to advance loans up to Rs. 10 corers to the industry. .. (27.5)

20. The State Government should also float loans to the extent of Rs. 15 crores, and advance this money to private sector on suitable rates of interest. .. (27.6)

21. The State Government should provide for bank guarantees amounting to Rs. 20 crores. .. (27.7)

22. The cases for import of raw materials, machinery etc. by the large scale units should be routed through the State Government authorities. .. (27.8)

23. Effective steps should be taken to procure requisite allocation of power which is about 488 M. Watts for the III Plan, in order to ensure planned development of heavy and medium scale industries. .. (27.9)

24. A high-powered Board like the Industries Development Board should be established, where important decisions about the execution of industrial schemes could be taken quickly and effectively. .. (27.12)

25. A technically well-equipped Heavy Industries organisation should be set up in the State for planning and execution of the entire development programme. It should consist of three development sections, one administrative section and a liaison office at Delhi. .. (28.1 to 3)

26. Provision should be made for the schemes as follows:— .. (29.4)

(1)	Heavy Industries Corporation (including Govt. investment towards capital structure of industrial enterprises)	Rs.	3.00	crores.
(2)	Mineral Development Corporation	Rs.	1.00	„
(3)	Organisation for Heavy Industries	Rs.	0.45	„
(4)	Industrial Research	Rs.	1.25	„
(5)	Industrial Area Scheme & Techno-economic survey.	Rs.	1.30	„
(6)	Govt. shares in U. P. Financial Corporation.	Rs.	1.00	„
	Total:	Rs.	8.00	crores.

27. Projects totalling to about Rs. 138 crores in cost are recommended for inclusion in the Central Plan for setting up industrial units in the public sector during the Third Five Year Plan period. Particulars of the projects are given in Table 'A'. (29.8)

28. An amount of Rs. 35 crores should be ear-marked in the State Plan for taking up industrial projects in the State sector during the Third Plan period. Particulars of the projects are given in Table 'B'. (29.11)

29. An investment of Rs. 12 crores has been proposed for the co-operative sector for establishing producer-goods industries during the Third Five Year Plan period. Details are given in Table 'C'. .. (29.12)

30. A programme for investment of Rs. 216 crores for producer-goods industries, and of Rs. 50 crores for consumer-goods industries is envisaged for the private sector during the III Plan. (29.13)

31. The total quantity of electric power required for the implementation of the various schemes during the Third Plan would be of the order of 488 M. Watts. Provision should be made for the supply of this essential power requirement. Year-wise break-up of the requirement may be as follows:— (29.18 & 19)

	1961-62	1962-63	1963-64	1964-65	1965-66
Power requirements in M. Watts.	55	78	95	120	140

32. A nuclear Power station should be established in western U.P. during the Fourth Plan period, to meet the growing power requirements of U.P. as well as Delhi area. .. (29.20)

APPENDICES

APPENDIX I

CONSTITUTION OF WORKING GROUPS OF THE COMMITTEE FOR DIFFERENT GROUPS OF INDUSTRIES

Working Group I. Pulp and Paper.

CONVENER:

Dr. J. B. Lal,
Industrial Chemist to Government, U.P.,
H. B. T. I., Kanpur.

MEMBERS:

1. Dr. S. R. D. Guha,
   Officer-in-charge,
   Cellulose & Paper Branch,
   F.R.I. & Colleges,
   Dehradun.

2. Sri R. P. Bhargawa,
   Manager,
   Star Paper Mills,
   Saharanpur.

3. Sri B. Biswas,
   H. B. T. I., Kanpur.

4. Sri V. P. Agrawal, PFS.,
   Conservator of Forests, (HQ), U.P.
   Lucknow.

5. Sri M.P. Bhargawa,
   Director,
   Central Research Laboratory,
   Dalmianagar.

Working Group II. Ceramics.

CONVENER:

Sri K. H. Parikh,
Glass Technologist,
H. B. T. I., Kanpur.

MEMBERS:

1. Sri J. C. Banerjee,
   Assistant Director,
   Central Glass & Ceramic Research Institute,
   Calcutta.

2. Sri D. D. Akruwala,
   Kumar Dhobi Fire Clay & Silica Works,
   Kumar Dhobi (W. Bengal).

3. Sri P. N. Agrawal,
   Jt. Director of Industries, U.P.

4. Sri J. C. Pande,
   Chief Engineer,
   Government Cement Factory,
   Churk (Mirzapur).

5. Sri T. N. Sharma,
   Assistant Director of Industries (Ceramics)
   Pottery Development Centre,
   Khurja.

6. Dr. M.L. Misra,
   Hindu University,
   Varanasi.

7. Dr. D. J. Badkas,
   Indian Institute of Science,
   Banglore.

8. Sri M.L. Joshi,
   M/s. Ganga Glass Works,
   (Hd. Qrs. New Delhi),
   Balawali.

Working Group III. Fermentation Industries.

CONVENER:

Sri W. R. Damle,
Alcohol Technologist to Govt., U.P.,
H. B. T. I., Kanpur.

MEMBERS:

1. Sri S. N. Gundu Rao,
   Director, National Sugar Institute,
   Kanpur.

2. Dr. J. B. Lal,
   Industrial Chemist to Government, U.P
   H. B. T. I., Kanpur.

3. Dr. A. R. Kidwai,
   Muslim University,
   Aligarh.

4. Professor J. P. Shukla,
   National Sugar Institute,
   Kanpur.

5. Dr. Kirpa Shanker,
Dy. Director of Industries, U.P.

6. Dr. K. S. Tewari,
Technical Officer to Excise Commissioner, U. P
Allahabad.

7. Dr. Hussain Zaheer,
Hyderabad.

8. Sri S. C. Roy,
M/s. Dyer Meakin Breweries,
Lucknow.

9. Sri S. C. Agrawal,
Central Drug Research Institute,
Lucknow.

10. Dr. M.L. Dhar,
Central Drug Research Institute,
Lucknow.

Working Group IV. Plastics & Allied Industries.

CONVENER:

Dr. E. D. Daruwala,
Principal,
Govt. Central Textile Institute
Kanpur.

MEMBERS:

1. Dr. S. I. Tarapore,
National Rayon Corporation Ltd.,
Kalyan, Bombay.

2. Dr. J. B. Lal,
Industrial Chemist to Govt., U.P.,
H. B. T. I., Kanpur.

3. Sri Om Prakash,
Oil Expert to Government, U.P.,
H. B. T. I., Kanpur.

4. Dr. A. N. Gulati,
Technical Expert,
Swadeshi Cotton Mills,
Kanpur.

5. Dr. S. L. Kapoor,
National Chemical Laboratory,
Poona.

6. Dr. G. S. Misra,
   Lucknow University,
   Lucknow.

7. Sri M. A. Ekambram,
   Manager,
   Sirsilk Ltd., Sirpur,
   Kagaznagar (Andhra Pradesh).

Working Group V. Fertilizers & Heavy Chemicals.

CONVENER:

Dr. D. R. Dhingra,
Jt. Director of Industries, U.P.

MEMBERS:

1. Sri J. J. Bagchi,
   Superintendent,
   Defence Research Laboratories,
   Kanpur.

2. Sri P. N. Agrawal,
   Jt. Director of Industries, U.P.

3. Dr. M. H. Desai,
   Delhi Polytechnic,
   Kashmiri Gate,
   Delhi.

4. Sri S. C. L. Jain,
   Sahu Chemicals,
   Sahupuri, Varanasi.

5. Sri Atma Prakash Gupta,
   Director,
   Kanpur Chemical Works (P) Ltd.,
   Anwarganj, Kanpur.

6. Dr. R. R. Agrawal,
   Agricultural Chemist,
   Kanpur.

7. A nominee of the Director,
   National Chemical Laboratory,
   Poona.

Working Group VI. Fine Chemicals and Pharmaceuticals.

CONVENER:

Dr. A. R. Kidwai,
Muslim University,
Aligarh.

MEMBERS:

1. Dr. B. Mukerjee,
   Director,
   Central Drug Research Institute,
   Lucknow.

2. Dr. S. Rohatgi,
   M/s. Hind Chemicals,
   Kanpur.

3. Dr. E. D. Daruwala,
   Principal,
   Government Central Textile Institute,
   Kanpur.

4. Sri Om Prakash,
   Oil Expert to Government, U.P.,
   H. B. T. I., Kanpur.

5. Professor K. N. Kaul,
   Director,
   National Botanical Gardens,
   Lucknow.

6. Dr. Satya Prakash,
   Secretary,
   Scientific Research Committee,
   Allahabad University.

7. Dr. S. D. Mahant,
   National Research Development Corporation,
   New Delhi.

8. Dr. N. K. Basu,
   Hindu University,
   Varanasi.

9. Dr. K. B. Lal,
   Director,
   Plant Protection, Government of India,
   New Delhi.

10. Dr. D. S. Srivastava,
    Entomologist, to Government, U.P.,
    Government Agriculture College,
    Kanpur.

11. Dr. R. K. Tandon,
    Principal,
    Government Agriculture College,
    Kanpur.

Working Group VII. Oils and Surface Coatings

CONVENER:

Sri Om Prakash,
Oil Expert to Government, U.P.,
H. B. T. I., Kanpur.

MEMBERS:

1. Sri K. Kapoor,
   Managing Director,
   M/s. Nagrath Paints,
   Kanpur.

2. Sri Hirdai Narain,
   M/s. Ganesh Flour Mills,
   Kanpur.

3. A representative from
   M/s. Black & White Company,
   Fazalganj,
   Kanpur.

Working Group VIII. Food and Allied Industries.

CONVENER:

Dr. D. N. Srivastava,
Director,
Fruit Utilisation,
Ranikhet.

MEMBERS:

1. Sri N. K. Bhargawa,
   Co-operative Dairy Development Officer,
   Lucknow.

2. Deputy Director,
   Horticulture,
   Saharanpur.

3. Dr. Girdhari Lal,
   Central Food Technological Research Institute,
   Mysore.

4. Sri Kurien,
   General Manager,
   Kaira District Co-operative Milk Producers Ltd., Anand.

   Kanpur.
   M/s. Hind Chemicals,

5. Dr. Surendra Rohatgi,

6. Sri Mangala Prasad,
   Assistant Director of Industries, U.P.,
   Kanpur.

7. Sri D. S. Saxena,
   Industrial Specialist,
   C/o Director-cum-Secretary,
   Planning Research and Action
   Institute, Kalakankar House,
   Lucknow.

8. Sri S. C. Roy,
   M/s. Dyer Meakin Breweries,
   Lucknow.

9. Sri Ramsurat Singh,
   Additional Director of Agriculture, U.P.,
   Lucknow.

Working Group IX. Electrical Engineering.

CONVENER:

Sri N. N. Kunjru, PA. (Tech.) to General Manager,
KESA, Kanpur.

MEMBERS:

1. Professor C. S. Ghosh,
   Head of Electrical Engg. Deptt.,
   Roorkee University.

2. Sri J. N. Tandon,
   Director,
   M/s. G.E.C., Kanpur.

3. Sri A. R. Kapoor,
   Development Officer (SSI)
   Directorate of Industries, U.P.,
   Kanpur.

4. Sri Ram Chand Baraunia,
   United Electric Trading Co., Latouche Road,
   Kanpur.

5. Dr. Rais Ahmad,
   Muslim University,
   Aligarh.

6. Sri Joshi,
   State Radio Officer,
   Lucknow.

Working Group X. Mechanical Engineering.

CONVENER:

Sri A. R. Kapoor,
Development Officer (SSI),
Directorate of Industries, U.P.,
Kanpur.

MEMBERS:

1. Sri S. S. Johri,
   Supdt. Ordnance Factory,
   Kanpur.

2. Dr. H. Trivedi,
   Principal,
   H.B. Technological Institute,
   Kanpur.

3. Sri R. K. Basu,
   Chief Engineer,
   Roadways Central Workshop, Kanpur.

4. Sri G. R. Athole,
   Professor of Sugar,
   National Sugar Institute,
   Kanpur.

5. Sri R. K. Singh, Engineer Manager,
   Government Precision Instruments Factory,
   Lucknow.

6. Incharge Government Agriculture Workshop,
   Lucknow.

7. Sri V. A. Kny,
   Technical Manager,
   Laxmiratan Cotton Mills,
   Kanpur.

8. Sri L. R. Nagpal,
   Principal,
   Northern Regional School of Printing Technology,
   Allahabad.

9. Sri N. N. Gokhle,
   Proprietor,
   Gas Metal Operators,
   Kanpur.

Working Group XI. Metallurgical Industries.

CONVENER:

Dr. H. Trivedi,
Principal,
H. B. T. I., Kanpur.

MEMBERS:

1. Sri Satya Murty,
   Development Officer (Tech.) to Govt. U.P.,
   Meerut.

2. Sri S. M. R. Singh,
   Assisstant Works Manager,
   Ordnance Factory,
   Kanpur.

3. Dr. Krishna Mohan,
   Director,
   Geology and Mining, U.P.,
   Lucknow.

4. Dr. Daya Swarup,
   Banaras Hindu University,
   Varanasi.

5. Sri S. S. Johri,
   Ordnance Factory,
   Kanpur, or his nominee.

6. Sri B. R. Nijhawan,
   Director, National Metallurgical Laboratory,
   Jamshedpur.

7. Sri K. N. Srivastava,
   Secretary, Hindustan Aluminium,
   8, Indian Exchange Place,
   Calcutta-1.

Working Group XII. Minerals.

CONVENER:

Dr. Krishna Mohan,
Director,
Geology and Mining, U.P.,
Lucknow.

MEMBERS:

1. Dr. Hari Narain,
   Supdt. Geophysicist,
   Oil and Natural Gas Commission,
   Dehradun.

2. Sri K. Singh,
   Dy. Director of Industries, U.P.

3. Sri K. H. Parikh,
   Glass Technologist to Govt., U.P.,
   H. B. T. I., Kanpur.

4. Dr. M. P. Netrawala,
   Head of Mining Deptt., Banaras Hindu University,
   Varanasi.

5. Dr. Raj Nath,
   Banaras Hindu University,
   Varanasi.

6. Dr. Daya Swaroop, Principal,
   College of Mining and Metallurgy,
   Banaras Hindu University,
   Varanasi.

7. Sri R. K. Tewari,
   Geologist,
   Government Cement Factory, Churk.

8. Dr. M.C. Rastogi,
   Chemistry Department,
   Lucknow University,
   Lucknow.

9. Supdt. Geologist,
   Geological Survey of India,
   Lucknow.

Working Group XIII. Leather and Allied Industries.

CONVENER:

Sri R. K. Agrawal,
Development Officer (Leather),
Kanpur.

MEMBERS:

1. Sri K. Smith of M/s. Cooper Allen,
   Kanpur.

2. Sri Nazar Mohd,
   M/s. Pioneer Tanneries and Glue Works (P) Ltd.,
   Kanpur.

3. Sri K. L. Muir, Principal,
   Government Leather Working School,
   Kanpur.

4. Dr. Y. Nayudamma,
Director,
Central Leather Research Institute,
Madras.
Dr. S. K. Barat, Asstt. Director,
Central Leather Research Institute,
Madras, [Alternate member for Dr. Nayudamma].

5. Sri Langwong,
Industrial Adviser to the Director-cum-Secretary,
Planning-cum-Research and Action Institute,
Kalakanker House,
Lucknow.

Working Group XIV. Forest Products.

CONVENER:

Sri V. P. Agrawal, PFS,
Conservator of Forests, (HQ), U.P.,
Lucknow.

MEMBERS:

1. Professor K. N. Kaul, Director,
National Botanical Gardens,
Lucknow.

2. Sri R. N. Singh,
Manager,
Rosin and Turpentine Factory
Bareilly.

3. Dr. D. Narayanmurti,
Division of Mechanical Technology.
Forest Research Institute,
Dehradun.

4. Dr. Surendra Rohtagi,
M/s. Hind Chemicals,
Kanpur.

5. Sri H. Thompson,
M/s. Ply-wood Factory,
Sitapur.

6. Dr. J. B. Lal,
Industrial Chemist to Government, U P.,
H. B. T. I., Kanpur.

Working Group XV. Sugar Industry

CHAIRMAN:

Secretary to Government, U.P.,
Industries Department, Lucknow.

CONVENER:

Sri G. S. Chooramani, IAS,
Cane Commissioner, U.P.,
Lucknow.

MEMBERS:

1. Secretary to Government, U.P.,
   Came Department, or his nominee.

2. Secretary to Government, U.P.,
   Agriculture Department, or his nominee.

3. Sri S. Dikshit,
   Assistant Development Commissioner,
   Lucknow.

4. Sri R. P. Nevatia,
   Hindustan Sugar Mills Ltd.,
   Mahatma Gandhi Marg,
   Bombay 1.

5. Sri S. S. Kanoria,
   9, Brabourne Road,
   Calcutta—1.

6. Sri D. R. Narang,
   2, Mall Avenue,
   Lucknow.

7. Professor J. M. Shah,
   Oudh Sugar Mills Ltd.,
   Hargaon, Sitapur.

8. Director, Indian Institute of Sugarcane Research,
   Lucknow.

9. Director, Sugarcane Research Station,
   Shahjahanpur.

10. Director, National Sugar Institute,
    Kanpur.

11. Sri A. P. Mathur,
    Dy. Director of Industries,
    (Village Industries Section), U.P.

Working Group XVI. Textile Industry.

CHAIRMAN:

Sri S. S. L. Kakkar, I.A.S.,
Secretary to Government, U.P.,
Industries Department,
Lucknow.

CONVENER:

Sri K. N. Srivastava, I.A.S.,
Additional Director of Industries,
(Heavy Industries), U.P.

MEMBERS·

1. A nominee of the Jute Commissioner,
   Government of India, Calcutta.

2. Director of Agriculture, U.P.,
   Lucknow.

3. Sri S. K. Chaudhry, I.A.S., Authorised Controller,
   M/s. Atherton West Mills Co. Ltd.,
   Kanpur.

4. Sri Ram Nath, Director,
   Regional Office of the Textile Commissioner,
   Kanpur.
5. Dr. E. D. Daruwala,
   Principal, Government Central Textile Institute,
   Kanpur.

6. Sri Lalit Bhagwati, M.S. (U.S.A.),
   Works Manager, Central India Manufacturing Co.,
   Gwalior.

7. Sri Triloki Nath Sharma,
   Textile Adviser,
   Delhi Cloth and General Mills, Co. Ltd.,
   Delhi.

8. Sri K. N. Modi,
   M/s. Modi Spg. & Wvg. Mills Co. Ltd.,
   Modinagar, Meerut.

9. Sri Ram Ratan Gupta,
   M/s. Laxmiratan Cotton Mills Co. Ltd.,
   Kanpur.

10. Sri P. K. Sahgal,
    The New Victoria Mills Co. Ltd.,
    Kanpur.

11. Sri Sohan Lal Singhania,
M/s. J. K. Cotton, Spg. and Wvg. Mills Co. Ltd

12. Dr. A. N. Gulati, C/o.,
M/s. Swadeshi Cotton Mills Co. Ltd.,
Kanpur.

13. Sri P. D. Singhania,
Director,
M/s. J. K. Jute Mills, Kanpur.

14. A representative from Lal Imli Woollen Mills,
(Branch of the British India Corporation Ltd.),
Kanpur.

Working Group XVII. Govt. Precision Instruments Factory. Lucknow.

CONVENER:

Sri R. K. Singh,
Engineer Manager,
Government Precision Instruments Factory,
Lucknow.

MEMBERS:

1. Sri K. N. Srivastava, I.A.S.,
Additional Director of Industries (Heavy Industries) U.P.,
Kanpur.

2. Sri K. Schroeter, Technician,
Government Precision Instruments Factory,
Lucknow.

3. Sri Musaddilal, Chief Engineer,
Local Self Government Engineering Department,
Lucknow.

4. Sri K. M. Lal, Director,
Medical and Health Services,
Lucknow.

5. Sri S. N. Gupta, I.P.S.,
Superintendent of Police, C.I.D., U.P.,
Lucknow.

Working Group XVIII. Govt. Cement Factory, Churk.

CONVENER:

Sri T. L. Mahendra, I.A.S.,
Director, Govt. Cement Factory,
Churk.

MEMBERS:

1. Sri P. N. Agrawal,
   Jt. Director of Industries (S), U.P.,
   Kanpur.

2. Sri M. M. Lal,
   Chief Chemist, Government Cement Factory,
   Churk.

3. Dr. H. Trivedi,
   Principal,
   H. B. T. I., Kanpur.

APPENDIX II

REQUIREMENTS OF HEAVY INDUSTRIES ORGANISATION

(YEAR WISE BUDGET ESTIMATES FOR DEVELOPMENT WINGS (A, B, C),
ADMINISTRATIVE WING AND LIASION OFFICE OF THE *HEAVY* INDUSTRIES
SECTION FOR THE III FIVE YEAR PLAN PERIOD).

Sl. no.	Item	1961-62	1962-63	1963-64	1964-65	1965-66	Grand Total
1	2	3	4	5	6	7	8
		Rs.	Rs.	Rs.	Rs·	Rs.	Rs.
1	*Pay of Officers*:						
	Development A Wing	60,100	79,300	1,04,550	1,12,900	1,19,500	
	,, B Wing	3,300	25,600	31,850	33,900	35,700	
	,, C Wing	2,750	3,300	6,350	7,200	7,800	
	Administrative Wing	6,600	9,550	36,400	66,690	97,950	
	Liaison Office ..	7,700	9,070	9,800	10,510	11,250	
	Total ..	80,450	1,26,820	1,88,950	2,31,200	2,72,200	8,99,620
2	*Pay of Establishment*:						
	Development A Wing	38,450	49,540	70,770	77,900	81,990	
	,, B Wing	10,660	21,120	30,390	32,800	34,570	
	,, C Wing	16,160	17,630	23,390	25,020	26,290	
	Administrative Wing	30,800	51,736	1,04,530	1,46,480	1,79,690	
	Liaison Office ..	12,270	18,364	26,020	29,690	32,100	
	Total ..	1,08,340	1,58,390	2,55,100	3,11,890	3,54,640	11,88,360
3	*Allowances*:						
	Developmnet A Wing	18,970	25,540	40,470	41,970	41970	
	,, B Wing	7,740	14,210	20,820	21,280	21,280	
	,, C Wing	10,320	10,630	14,370	14,620	14,620	
	Administrative Wing	17,100	30,830	60,120	84,390	98,670	
	Liaison Office ..	13,420	16,100	20,890	22,640	23,350	
	Total ..	67,550	97,310	1,56,670	1,84,900	1,99,890	7,06,320

Sl.no.	Item	1961-62	1962-63	1963-64	1964-65	1965-66	Grand total
1	2	3	4	5	6	7	8
		Rs.	Rs	Rs.	Rs.	Rs.	Rs.
4	*A—Contengencies (Recurring)*:						
	Development A Wing	20,750	29,750	44,750	16,750	16,750	
	,, B Wing	5,950	9,850	12,650	8,450	8,450	
	,, C Wing	5,050	5,050	8,600	5,000	5,000	
	Administrative Wing	12,500	19,650	32,350	26,250	30,750	
	Liaison Office ..	28,250	30,650	31,200	31,200	31,200	
	Total ..	72,500	94,950	1,29,550	87,650	92,150	4,76,800
4	*B—Contingencies (non-(Recurring* :)						
	Development A Wing	6,000	3,300	14,800	..	..	
	,, B Wing	2,500	8,000	5,000	..	..	
	,, C Wing	2,800	..	2,800	..	..	
	Administrative Wing	4,900	77,400	50,700	26,300	20,400	
	Liaison Office ..	28,000	..	2,000	..	..	
	Total ..	44,200	88,700	75,300	26,300	20,400	2,54,900
81	*Civil Works*:						
	Development Wings (A, B, C).	..	..	..	..	..	
	Administrative Wing	2,50,000	5,00,000	2,50,000	..	..	
	Liaison Office ..	..	..	..	..	..	10,00,000
	D—Works:						
	Development Wings (A, B, C).	..	..	..	..	..	
	Administrative Wing	..	..	..	7,000	7,000	14,000
	Liaison Office ..	..	..	..	..	..	..
	Grand Total ..	6,23,040	10,66,170	10,55,570	8,48,940	9,46,280	45,40,000

APPENDIX III—AREA-WISE DISTRIBUTION OF PROPOSED INDUSTRIAL UNITS IN UTTAR PRADESH.

rial no.	Part of the State	Name of the Division	No. of units Proposed	Cost involved (in crores of Rs.)	Percentage of total cost of the project	Power required in M. W.	Name of the Grid or Grids affected
1	2	3	4	5	6	7	8
I	Hilly areas	1. (i) Kumaun	13	16.7		11.2	Ganga Grid.
		(ii) Hilly part of Dehra Dun District in Meerut Division.	3	22.8		13.0	
		Total ..	16	39.5	10.1	24.2	
II	Eastern U. P.	2. Gorakhpur	23	49.1		50.1	Rihand and Kanpur-Matatila grid.
		3. Varanasi	37	69.3		136.4	
		4. Allahabad	34	39.8		46.2	
		Total ..	94	158.2	40.2	232.7	
III	Bundelkhand	5. Jhansi	6	3.6		2.5	Kanpur Matatila Grid.
		Total ..	6	3.6	0.9	2.5	

1	2	3	4	5	6	7	8
IV	Central	6. Fyzabad	7	2.2		4.0	Sharda and Ganga Grid.
		7. Bareilly	22	19.5		19.2	
		8. Lucknow	29	11.4		13.9	
		Total ..	58	33.1	8.4	37.1	
V	Western U. P.	9. Meerut	32	34.5		38.8	Ganga Grid.
		10. Agra	25	5.9		9.9	
		Total ..	57	40.4	10.3	48.7	
VI	Units which may be started in any part of the State.	..	132	118.2		79.8	
		Total ..	132	118.2	30.1	79.8	
		GRAND TOTAL ..	363	393.0	100.0	425.0	

It would be observed that the backward areas such as Hilly tracts and Eastern Districts have been fully served.

It is proposed that out of the percentage of 30.1 relating to units which would be set up in any part of the State, 8.1 per cent. could be earmarked for Bundelkhand, 12 per cent. for Central Districts and 10 per cent. for Western Districts to give a fairly balanced distribution of industrial units throughout the State.

APPENDIX IV

REQUIREMENTS OF POWER FOR EXPANSION OF EXISTING LARGE AND MEDIUM SCALE UNDERTAKINGS DURING THIRD FIVE YEAR PLAN PERIOD.

Sl. No.	Name of the District	No. of units	Further power required during Third Five Year Plan. K.W.
1.	Kanpur.	6	9340
2.	Meerut.	10	8510
3.	Allahabad	6	5850
4.	Saharanpur	3	5150
5.	Dehradun	3	750
6.	Gorakhpur	1	750
7.	Mirzapur	1	700
8.	Rampur	2	580
9.	Lucknow	1	500
10.	Agra	2	400
11.	Sitapur	1	200
12.	Aligarh	1	190
13.	Varanasi	1	160
14.	Mathura	1	150
15.	Etawah	1	100
16.	Bijnore	1	100
	Total:	41	33430 Say 33 M.W.

The above list is not exhaustive as several units were not able to estimate their future demand during the period 1961-66, at this stage.